

Rhodora

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REVISION OF THE GENUS MELAMPODIUM
(COMPOSITAE: HELIANTHEAE)¹

TOD F. STUESSY

(Continued from page 70)

II. *Melampodium* section *Zarabellia* (Cass.) DC.

Melampodium L. sect. *Zarabellia* (Cass.) DC. Prodr. 5: 519. 1836. *Zarabellia* Cass. Dict. Sc. Nat. 59:240. 1829. Type species: *Melampodium longifolium* Cerv. ex Cav.

Tap-rooted annuals; leaves rhombic to deltoid (rarely narrowly ovate), sessile or shortly petiolate, with margins entire to obscurely serrate; outer involucre usually cupulate or less often spreading, with bracts 3-5, at margins herbaceous; ovaries of the disc florets ovoid, less than 0.7 mm long, rudimentary (Figs. 3 & 4); fruits at apex nearly smooth or moderately sculptured, or sometimes with an abaxial protuberance (in *M. longifolium*, Fig. 7); chromosome base number, $x = 9$. Species 21-25.

21. *Melampodium longifolium* Cerv. ex Cav. Anal. Cien. Nat. 6:333. 1803. *non* Brouss. ex Willd. 1809. TYPE: "NUEVA HISPANIA": grown from seed in the Royal Bot. Gard. Madrid, flowering Jun-Sep, V. Cervantes s.n. (Holotype, MA?; isotype, G!; photograph of G-DC isotype, IDC 800. 927: III. 6!; photograph of G isotype, F! US!).

Melampodium longifolium Brouss. ex Willd. Enum. Plant. Hort. Berol. 934. 1809. *nom. illegit. non* Cerv. ex Cav. 1803.

TYPE: MEXICO: locality, date, and collector unknown, cultivated in Bot. Gard. Berlin and harvested in 1808 (Holotype, B; photograph of holotype, TEX!).

Zarabellia rhomboidea Cass. Dict. Sc. Nat. 59:241. 1829. TYPE: cultivated in Bot. Gard. Paris, source of seeds unknown (Holotype, P?; photograph of possible G-DC isotype, IDC 800. 927: III. 7!).

Dysodium divaricatum Hort. ex DC. Prodr. 5:520. 1836. *non* Rich. in Pers. 1807. *nom. illegit., pro syn.*

Melampodium rhomboideum (Cass.) DC. Prodr. 5:520. 1836.

Melampodium parvulum Brandg. Zoe 5:262. 1908. TYPE: MEXICO: Puebla, Cerro Santa Lucia, Jul 1907, C. A. Purpus 2813 (not 2813') (Holotype, UC!; isotypes, F! GH! NY! US!; photograph of US isotype, TEX!).

Annual herbs, 8-45 cm long. Stems erect, 1.5-4 mm diam, moderately hispid near base to copiously hispid above with hairs 0.8 mm long. Peduncles 0-21 mm long. Leaves sessile, rhombic (rarely elliptic, younger leaves often lanceolate-ovate), 2.5-6 cm long, 0.5-2.7 cm wide, at apex acute, at base subauriculate, with both surfaces moderately pubescent with hairs 0.3 mm long; margin obscurely serrate. Heads 3-4 mm tall, 5-7 mm diam. Outer involucre spreading, 7-10 mm diam; bracts 5 (rarely 4), separate, lanceolate, 3-5 mm long, 1.2-2 mm wide, at apex acute-acuminate, with abaxial surface glabrous to moderately pubescent (very pubescent at base) with hairs 0.7 mm long; margin herbaceous. Fruits 2.2-3 mm long, with lateral surfaces with 2 large irregular cavities. Ray florets 5-8; ligules yellow, ovate-elliptic, 1.3-1.5 mm long, 0.8-0.9 mm wide. Disc florets 10-15; corollas yellow, 0.8 mm diam, with throat 0.7 mm and tube 0.6 mm long. Paleae oblong, 1.4 mm long, 0.7 mm wide; apex colorless, with margin erose; midrib distinct, glabrous. Chromosome number, $n = 9$.

Scattered throughout pine-oak forests in the Mexican states of Nuevo León, San Luis Potosí, México, Distrito

Federal, Puebla, and Oaxaca (Fig. 12), 1830-2740 m. Flowering dates, Aug-Sep.

REPRESENTATIVE SPECIMENS. Mexico. DISTRITO FEDERAL: Tlalpán, Pedregal, Valley of Mexico, 20 Aug 1896, *Harshberger* 176 (GH); Tlalpán, Pyramid of Cuicuilco, 15 Aug 1935, *MacDaniels* 53 (F); Valley of Mexico near Tlalpán, 20 Aug 1896, *Pringle* 6455 (F, GH, NY, UC, US); Pena Pobre near Tlalpán, 8 Aug 1944, *Sharp* 44208 (NY). MÉXICO: near El Oro, 14 Sep 1901, *Pringle* 9325 (F, GH, US). NUEVO LEÓN: Hacienda Pablillo, Galeana, 8 Aug 1936, *Taylor* 115 (DS, F, NY, RSA, TEX). OAXACA: N limits of Las Sedas, 15 Aug 1966, *Stuessy* 659 (TEX). PUEBLA: vicinity of Puebla, 9 Sep 1906, *Arsène* 76 (US), 27 Oct 1907, *Arsène* 1199 (US), 10 Sep 1910, *Nicolas* 5447 (GH, US), s.n. (NY); Teocalli de Cholula, near Puebla, 25 Sep 1909, *Nicolas* s.n. (NY); Rancho Posadas, near Puebla, 25 Sep 1909, *Nicolas* s.n. (NY); vicinity of San Luis Tultitlanapa, Aug 1908, *Purpus* 2813' (F, GH, NY, UC, US). SAN LUIS POTOSÍ: vicinity of San Luis Potosí, 1878, *Parry & Palmer* 444 (F, GH, NY, US); 22 mi E of San Luis Potosí, 5 Aug 1961, *Powell & Edmondson* 551 (F, TEX).

22. **Melampodium mimulifolium** Robins. Proc. Amer. Acad. Arts & Sci. 36:462. 1901. TYPE: MEXICO: Oaxaca, Totontoppec, 1700-2150 m, 15 Jul 1894, *E. W. Nelson* 740 (Holotype, US!; photograph of holotype, TEX!).

Annual herbs, over 30 cm tall. Stems erect, 2-3 mm diam, subglabrous below to pilose-villous above with hairs 1 mm long. Peduncles 3-4.2 cm long. Leaves sessile, lanceolate-elliptic, 4.5-6.8 cm long, 1.5-2.2 cm wide, at apex acuminate, at base subauriculate to auriculate, with both surfaces strigose with hairs 0.4-1 mm long; margin entire to serrulate. Heads 6-7 mm tall, 8-10 mm diam. Outer involucre spreading to shallowly cupulate, 8-9 mm diam; bracts 5, slightly connate at base, ovate-lanceolate, 5-6 mm long, 2-2.5 mm wide, at apex acute, with abaxial surface moderately pilose with hairs 0.5-1 mm long; margin herbaceous. Fruits 2-2.1 mm long, with lateral surfaces smooth-striate with enlarged tuberculate margins. Ray florets ca 8; ligules yellow-orange, ovate, 3-4 mm long, 1.5-3 mm wide. Disc florets ca 50; corollas yellow, 1 mm diam, with throat 0.8 mm and tube 1.4 mm long. Paleae oblanceolate-obovate, 2.2 mm long, 0.8 mm wide; apex yellow, with margin erose-

laciniate; midrib weak, glabrous. Chromosome number unknown.

Known only from the type collection from pine-oak forests at Totontopec, Oaxaca, Mexico (Fig. 12), 1700-2150 m. Flowering date, Jul.

M. mimulifolium is very similar to *M. gracile*, and in fact, additional collecting may disclose transitional specimens that might suggest merger of the two species. At present, however, *M. mimulifolium* seems treated best as a distinct species that can be distinguished from *M. gracile* by the former's shorter peduncles, narrower leaves, longer and narrower outer phyllaries, and absence of stipitate-glandular hairs anywhere on the plant.

23. **Melampodium gracile** Less. *Linnaea* 6:407. 1831. TYPE: MEXICO: Veracruz, Papantla, Jan 1829, *C. J. W. Schiede & F. Deppe* 1254 (Lectotype, HAL!; isotypes, HAL! P! W! MO! photograph of lectotype, OS! TEX!; photograph of HAL isotype, OS! TEX!; photograph of P isotype, OS! TEX!).

Melampodium oblongifolium DC. *Prodr.* 5:519. 1836. TYPE: MEXICO: Veracruz, "rancho de los huevos" [from label] near Tantoyuca, Jan 1832, *J. L. Berlandier* 2153 [= 733] (Lectotype chosen, G-DC; isotypes, F! G [2]! GH! K [2]! MO! P!; photograph of lectotype, IDC 800. 927: III. 2!; tracing of lectotype, GH!; photograph of G-DC isotype, IDC 800. 927: III. 3!; photograph of K isotypes, US [2]!).

Melampodium gracile Less. var. *oblongifolium* (DC.) A. Gray, *Proc. Amer. Acad. Arts & Sci.* 5:182. 1861.

Melampodium microcarpum S. F. Blake, *Contrib. U. S. Nat. Herb.* 22:606. 1924. TYPE: MEXICO: Tamaulipas, vicinity of Gómez Farías, ca 350 m, 13-21 Apr 1907, *E. Palmer* 319 (Holotype, US!; isotype, GH! MO!; photograph of holotype, TEX! UC!).

Annual herbs, 17-50 cm tall. Stems erect, 1.2-4 mm diam, hispid-pilose and weakly stipitate-glandular with hairs 0.1-2 mm long. Peduncles 5.5-11.5 cm long. Leaves sessile,

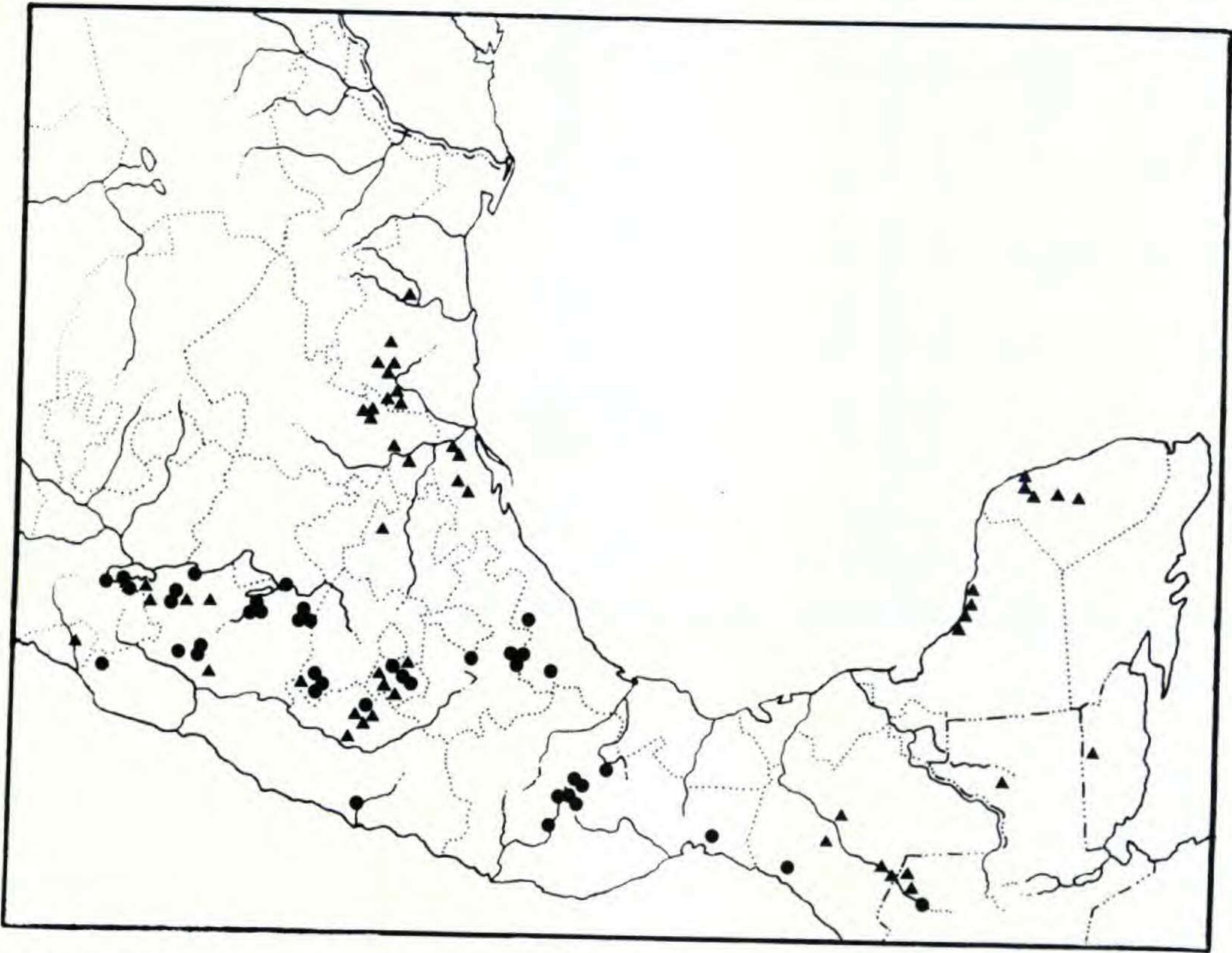


Fig. 21. Map of Mexico and adjacent Guatemala and British Honduras showing distribution of *Melampodium gracile* (triangles), and *M. microcephalum* (dots).

usually deltoid (younger leaves often lanceolate), 5-10 cm long, 2-4 cm wide, at apex acute to acuminate, at base narrowed and dilated near stem to subauriculate (rarely obtuse), with both surfaces strigillose with hairs 0.2 mm long; margin obscurely crenate to irregularly cleft. Heads 6-7 mm tall, 8-15 mm diam. Outer involucre spreading to shallowly cupulate, 7-10 mm diam; bracts 3 (sometimes 4 or 5), slightly connate at base, imbricate $\frac{1}{3}$ their length, ovate, 3.5-5 mm long, 2.5-3.5 mm wide, at apex acuminate, with abaxial surface strigose with hairs 0.3-1 mm long near apex, near base stipitate-glandular with hairs 0.1-0.2 mm long; margin herbaceous. Fruits 2.3-2.5 mm long, with lateral surfaces reticulate and striate to tuberculate. Ray florets 5-8; ligules yellow-orange, ovate, 2-5 mm long, 3-4 mm wide. Disc florets 30-45; corollas yellow-orange, 1.5

mm diam, with throat and tube each 0.9 mm long. Paleae oblanceolate-obovate, 2.2 mm long, 0.8 mm wide; apex yellow-orange, with margin entire to dentate-laciniate laterally; midrib absent. Chromosome number, $n = 9$.

Pine-oak, tropical deciduous, tropical evergreen, and rain forests on the Gulf side of the Sierra Madre Oriental and the Yucatan Peninsula, and on the Pacific sides of the Sierra Madres Occidental and Sur, with extensions into British Honduras and northwestern Guatemala (Fig. 21), 30-1830 m. Flowering dates, Jul-Oct.

Melampodium gracile is very similar morphologically and geographically to *M. microcephalum*, but the two differ in several features such as habit, and the shapes of leaf bases, outer involucral bracts, and ligules. Single populations of both species have been crossed reciprocally in the greenhouse, and although robust F_1 hybrids are obtained, they are almost completely sterile. Detailed analyses of hybridization among all three species in the genus that have stipitate-glandular peduncles (*M. gracile*, *M. microcephalum* and *M. paniculatum*) currently are in progress and the results will be reported in a separate paper.

REPRESENTATIVE SPECIMENS. **British Honduras.** EL CAYO: San Agustín, Jul-Aug 1936, *Lundell* 6759 (ARIZ, GH, NY, TEX [2], US). **Guatemala.** HUEHUETENANGO: between San Sebastián H. & San Rafael Pétzal, 14 Aug 1942, *Steyermark* 50539 (F); between Nentón & Miramar, 29 Aug 1942, *Steyermark* 51452 (F, UC). PETÉN: vicinity of La Libertad, Aug-Nov 1933, *Aguilar* 25 (F [photograph of US specimen], NY, US). **Mexico.** CAMPECHE: Champotón, 7-15 Jul 1932, *Steere* 1805 (US); 1 mi W of Champotón, 18 Jul 1966, *Stuessy* 531 (TEX); 16 mi N of Champotón, 18 Jul 1966, *Stuessy* 533 (TEX); 12 mi S of Campeche, 25 Jul 1966, *Stuessy* 546 (TEX). CHIAPAS: ca 28 mi SE of Comitán, 25 Jun 1960, *King* 3042 (DS, NY, TEX, UC, US); ca 17 mi S of Tuxtla Gutiérrez, 27 Jun 1960, *King* 3096 (DS, NY, TEX, UC, US); 10 mi S of Bochil, 25 Jul 1966, *Stuessy* 562 (TEX); 32 mi SE of Comitán, 26 Jul 1966, *Stuessy* 574 (TEX). COLIMA: 7 mi S of Colima, 25 Aug 1966, *Stuessy* 722 (TEX). GUERRERO: Acuitlapán, 24 Sep 1937, *Abbott* 439 (GH); Río Balsas, Aug 1910, *Orcutt* 4365 (F); near Iguala, 14 Sep 1900, *Pringle* 9177 (F, GH, SMU, UC, US), 10 & 12 Aug 1905, *J. N. & J. S. Rose, & Painter* 9308 (GH, US). HIDALGO: Jacala, 20 Oct 1937, *Kenoyer* 427 (F). MÉXICO: Temas-

caltepec, Anonas, 24 Jul 1934, *Hinton* 6338 (US). MICHOACÁN: ca 4 mi E of Jiquilpán, 6 Aug 1960, *King* 3636 (DS, NY, TEX, UC, US); ca 3 mi E of Zamora, 6 Aug 1960, *King* 3646 (DS, NY, TEX, UC, US); 30 mi NW of Zamora, 2 Sep 1965, *Stuessy* 393 (TEX); 25 mi S of Ario de Rosales, 20 Aug 1966, *Stuessy* 694 (TEX); 2 mi S of jct rte 15 & rd to Cotija, 24 Aug 1966, *Stuessy* 713 (TEX). MORELOS: ca 11 mi S of Cuernavaca, 14 Mar 1961, *King* 4165 (TEX); 6 mi W of Yautepec, 14 Aug 1950, *Pipes* 81 (SMU); valley near Jojutla, 17 Jun 1901, *Pringle* 8466 (F, GH, NY, POM, UC, US); near Yautepec, 27 Oct 1902, *Pringle* 9937 (F, GH, NY, US); 7 mi NW of Cuautla, 25 Aug 1965, *Stuessy* 356 (TEX). SAN LUIS POTOSÍ: El Pujal, Río Tampaón valley, 21 Jul 1939, *Chase* 7533 (ARIZ, F, GH, NY); El Salto, 15 Jun 1951, *Holman & Dittman* 791 (SMU); El Salto, 14 Jun 1951, *Kay & Higgins* 202 (SMU); El Salto, 20 Feb 1961, *King* 3887 (F, NY, TEX, US); 48 mi N of Tamazunchale, 23 Aug 1957, *Waterfall & Wallis* 14288 (SMU). TAMAULIPAS: 7 mi N of Padilla, 9 Jun 1951, *Paynet & Hulan* 1213 (SMU, TEX); 10 km NW of El Progreso, 22 Aug 1941, *Stanford, Retherford & Northcraft* 1078 (ARIZ, DS, GH, NY); 15 mi SW of Ciudad Mante, 9 Aug 1965, *Stuessy* 274 (TEX [2]); ca 3-4 mi E of Nuevo Morelos, 5 Jul 1966, *Stuessy* 463 (TEX); 3 mi E of Gómez Farías, 8 Jun 1967, *Stuessy* 826 (TEX). VERACRUZ: Huasteca, Wartenberg, near Tantoyuca, 1858, *Ervendberg* 92 (GH); 13 mi W of Orizaba, 18 Nov 1959, *Graham & Johnston* 4777 (TEX); 7 mi SW [SE] of Morelos, 12 Aug 1961, *Powell & Edmondson* 646 (F, TEX); Jalapa, 1894, *Smith* 1605 (GH, UC); 18 mi S of jct rtes 110 & 105, 6 Jul 1966, *Stuessy* 466 (TEX). YUCATÁN: Progreso, *Gaumer* 2349 (F); Izamal, 1895, *Gaumer & sons* 789 (DS, F, GH [2], NY [2], POM, UC [3], US); at km 13 on Merida-Progreso rd, May-Aug 1938, *C. & A. Lundell* 7972 (DS, F, TEX, UC, US); 13 km N of Merida, 20 Jul 1966, *Stuessy* 537 (TEX); 86 mi W of Valladolid, 21 Jul 1966, *Stuessy* 544 (TEX [2]).

24. **Melampodium microcephalum** Less. *Linnaea* 9:268. 1834. TYPE: MEXICO: in cultivation near Hacienda de la Laguna, Jul 1829, *C. J. W. Schiede* 217 (Holotype, HAL!; isotype, P!; photograph of holotype, OS! TEX!; photographs of P isotype, F! OS! TEX! US!).

Melampodium lanceolatum Sessé & Moc. *Fl. Mex.* ed. 2. 196. 1894. *nom. illegit. non* DC. 1836. TYPE: "calidoribus Novae Hispaniae regionibus," Jul 1795-1804, *M. Sessé et al.* "3978" (Lectotype chosen, MA! [drawing of stem with two pairs of leaves on reverse side of label]; isotypes, MA [3]!).

Annual herbs, 15-75 cm tall. Stems erect to decumbent and rooting at nodes, 1-2 mm diam, villous and weakly stipitate-glandular with hairs 0.1-1 mm long. Peduncles 2.5-6.5 cm long. Leaves sessile or with petioles 1-4 mm long, ovate-lanceolate, 3-6.5 cm long, 0.9-3.5 cm wide, at apex acute to obtuse, at base attenuate to obtuse, with both surfaces strigose with hairs 0.2-1 mm long; margin entire to obscurely crenate. Heads 3-4 mm tall, 5-10 mm diam. Outer involucre spreading to shallowly cupulate, 5-8 (-10) mm diam; bracts 3 (sometimes 4 or 5), slightly connate at base, separate, narrowly ovate, 3-4.5 mm long, 1.5-3 mm wide, at apex acuminate, with abaxial surface pilose-villous and stipitate-glandular with hairs 0.1-1 mm long; margin herbaceous. Fruits 1.7-2 mm long, with lateral surfaces rugose-reticulate with enlarged tuberculate margins. Ray florets 5-8; ligules yellow-orange, elliptic, 2.5-4 mm long, 2-3 mm wide. Disc florets 35-50; corollas yellow-orange, 1.6 mm diam, with throat 1 mm and tube 0.7 mm long. Paleae oblanceolate-obovate, 2 mm long, 0.8 mm wide; apex yellow, with margin serrulate-laciniate; midrib absent. Chromosome number, $n = 9$.

Mostly pine-oak, tropical deciduous and tropical evergreen forests in many states of Mexico in the Mesa Central and the Sierra Madres Occidental and Sur, and in adjacent Guatemala (Fig. 21), 50-1740 m. Flowering dates, Jun-Nov.

M. microcephalum is often confused with *M. gracile* and *M. paniculatum*. Although all these taxa possess three outer involucre bracts, stipitate-glandular stems and peduncles, and chromosome numbers on a base of $x = 9$, the size of the heads and the shapes of the leaf bases can be used to distinguish easily one from another (see key).

In most taxa of *Melampodium* the number of outer involucre bracts is very constant, but in both *M. microcephalum* and *M. gracile*, as seen from field and greenhouse studies, plants occasionally are found with four or five bracts instead of the usual three.

REPRESENTATIVE SPECIMENS. **Guatemala.** HUEHUETENANGO: ca 6 mi S of Huehuetenango, 18 Jul 1960, *King* 3425 (DS, NY, TEX, UC, US). **Mexico.** CHIAPAS: 10 mi SE of Tonalá, 10 Aug 1966, *Stuessy* 627 (TEX). GUANAJUATO: near Acambaro, 18 Oct 1904, *Pringle* 13069 (F, GH, SMU, UC). GUERRERO: Taxco, 28 July 1937, *Abbott* 304 (GH); 20 mi NE of Acapulco, 20 Aug 1947, *Barkley, Webster & Paxson* 17M732 (TEX); Mina, Manchón, 7 Aug 1936, *Hinton* 9205 (ARIZ); Mina, Río Frio, 25 Sep 1937, *Hinton et al.* 10719 (ARIZ, GH, POM, TEX, US). JALISCO: Cerro Viejo, above Zapotitán de Hidalgo, ca 45 mi S of Guadalajara, 27 Jun 1956, *Gregory & Eiten* 205 (SMU). MÉXICO: Temascaltepec, Volcán, 10 Sep 1932, *Hinton* 1661 (F, GH, NY [2], US); Temascaltepec, Bejucos, 6 Oct 1932, *Hinton* 2008 (DS, F, NY [2], US); Temascaltepec, Ixtapán, 22 Jun 1934, *Hinton et al.* 6207 (F, GH, US). MICHOACÁN: 7 mi W of La Piedad, 6 Oct 1962, *Cronquist* 9613 (NY, TEX, US); ca 3 mi S of Ciudad Hidalgo, 4 Aug 1960, *King* 3607 (DS, NY, TEX, UC, US); ca 22 mi S of Uruapán, Cerro de Carboneras, 16-22 Oct 1961, *King & Soderstrom* 4804 (NY, SMU, TEX, UC, US); Lake Cuitzeo, 26 Oct 1892, *Pringle* 4322 (F, GH [2, one a tracing], NY, UC [2], US); 6 mi NW of Tuxpán, 1 Sep 1965, *Stuessy* 383 (TEX). MORELOS: El Teycal, 9 km SW of Tepoztlán, 30 Aug 1955, *Clausen* s.n. (NY); Cuantla, Aug 1904, *Kuntze* 23527 (NY [3]); Yautepec, 30 May 1939, *Nagel* 8030 (GH); Barranca, near Cuernavaca, 2 Nov 1896, *Pringle* 7321 (GH, US); Moyotepec, 8 Nov 1964, *Ripley & Barneby* 13708 (NY). OAXACA: Cerro de San Felipe, 26 Sep 1897, *Conzatti & González* 550 (GH, US); 10-12 km E of Niltepec, 18 Jul 1959, *King* 1833 (NY, SMU, TEX, UC, US); vicinity of Choapám, 28-29 Jul 1894, *Nelson* 870 (US); 1 mi E of Monte Albán, 12 Aug 1966, *Stuessy* 638 (TEX); 29 mi S of Zimatlán, 12 Aug 1966, *Stuessy* 640 (TEX). PUEBLA: Mt Orizaba, *Botteri* 809 (F, GH); near Puebla, Jul 1888, *Hoffmann* 832 (GH); Orizaba, 27 Mar 1887, *Mills-paugh* s.n. (F); Mt Orizaba, 24 Aug 1891, *Seaton* 461 (F, GH, NY, US). VERACRUZ: Tantoyuca, Dec 1830, *Berlandier* s.n. (GH); valley of Córdoba, 20 Jan 1866, *Bourgeau* 1628 (GH, US); valley of Córdoba, 23 Apr 1865-66, *Bourgeau* 1629 (US); Pacho, near Jalapa, Jan 1894, *Smith* 1655 (F, NY, RSA).

25. *Melampodium paniculatum* Gardn. Hook. Lond. Jour. Bot. 7:287. 1848. TYPE: BRAZIL: Goias, near Arraias, Apr [Feb?] 1840, *G. Gardner* 3844 (Holotype, K!; isotypes, F [2]! G [2]! NY [2]! P! W!; photograph of holotype, US!; photograph of G isotype, F! US!).

Melampodium laxum Sch. Bip. Ber. Bot. Zeit. 3:155. 1845. *nom. nud.* Based on *G. Gardner* 3844.

Melampodium brachyglossum J. D. Smith, Bot. Gaz. 13: 74. 1888. TYPE: GUATEMALA: Alta Verapaz, Cobán, 4300 ft, May 1886, *H. von Tuerckheim* 114 (Lectotype chosen, US!; isotype, US!; photograph of holotype, TEX!). K, NY & P specimens that bear exactly the same printed label as the lectotype are clearly *Jaegeria hirta* (Lag.) Less. (see Torres, 1968, for agreement). It is probably a labeling error.

Annual herbs, 13-70 cm tall. Stems erect, 0.7-5 mm diam, hispid and stipitate-glandular with hairs 0.1-1 mm long. Peduncles 1.1-5 cm long. Leaves sessile or with petioles up to 5 mm long, ovate-rhombic (younger leaves approaching lanceolate), 3-9 cm long, 1-5 cm wide, at apex acute to acuminate, at base attenuate, often dilated almost to subauriculate, with both surfaces strigose with hairs 0.3-1 mm long; margin entire to irregularly serrate-crenate. Heads 2.2-4.5 mm tall, 3-5.5 mm diam. Outer involucre cupulate, 3-7 mm diam; bracts 3, separate, ovate, 1.8-4 mm long, 1.5-2.8 mm wide, at apex acute-acuminate, with abaxial surface strigose and stipitate-glandular with hairs 0.1-0.8 mm long; margin herbaceous. Fruits 2-2.8 mm long, with lateral surfaces with longitudinal ribs and striations. Ray florets 3-5; ligules yellow, ovate, 1-2 mm long, 1-2 mm wide. Disc florets 10-15; corollas yellow, 1.1 mm diam, with throat and tube each 0.8 mm long. Paleae elliptic, 1.3 mm long, 0.7 mm wide; apex yellow-orange, with margin laciniate; midrib weak, glabrous. Chromosome numbers, $n = 8$ and 27.

Low tropical mountains of Chiapas, Mexico, Central America (excluding British Honduras, Nicaragua, and Panama), and isolated points of Colombia and Brazil in South America (Figs. 22 & 23), 370-2010 m. Flowering dates, Jan-Dec.

Adding to the chromosomal diversity already existing in *Melampodium* are the new counts in *M. paniculatum* of $n = 27$ reported from two different populations in Brazil

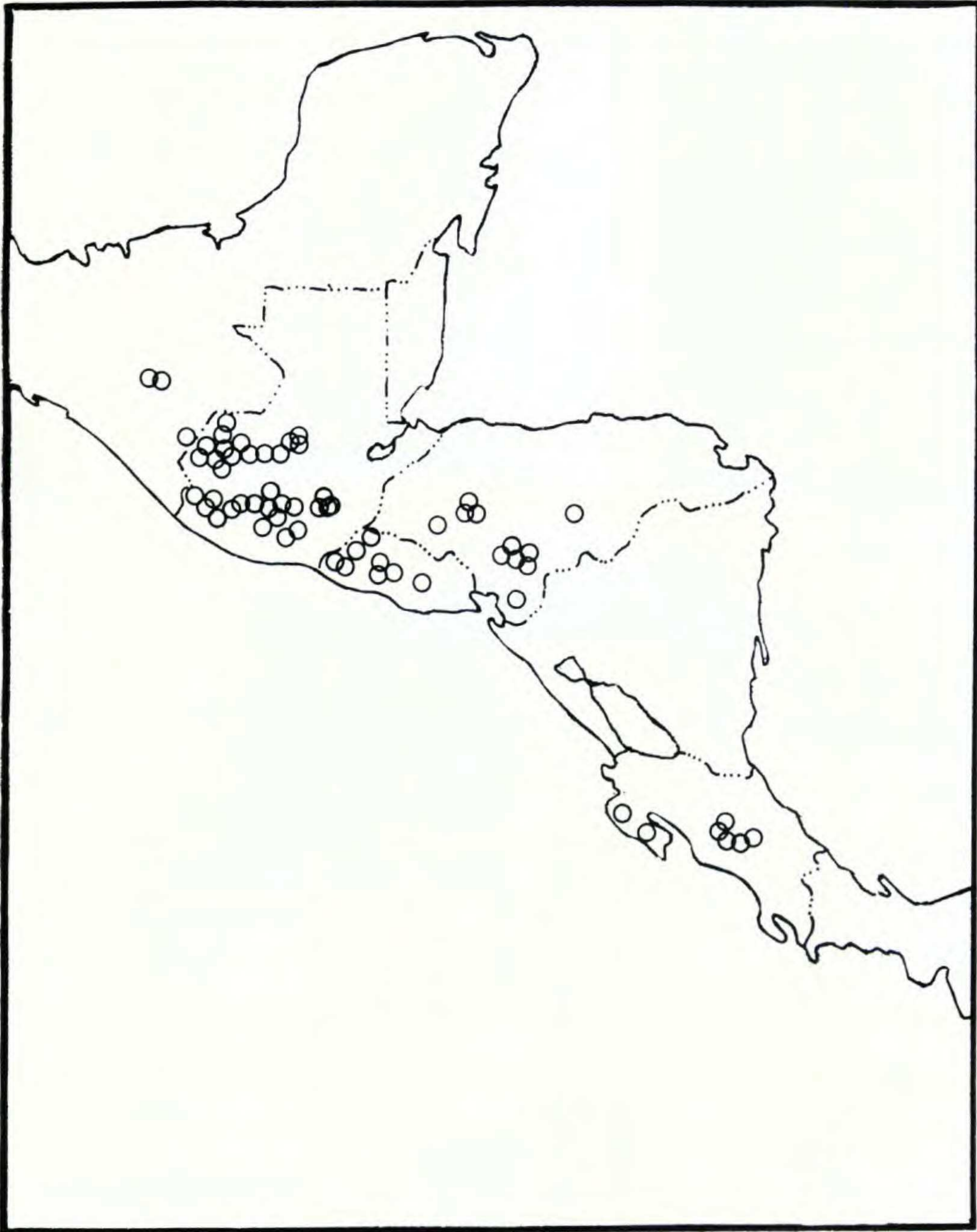


Fig. 22. Map of Central America showing distribution of *Melampodium paniculatum*. See Fig. 23 for South American localities.

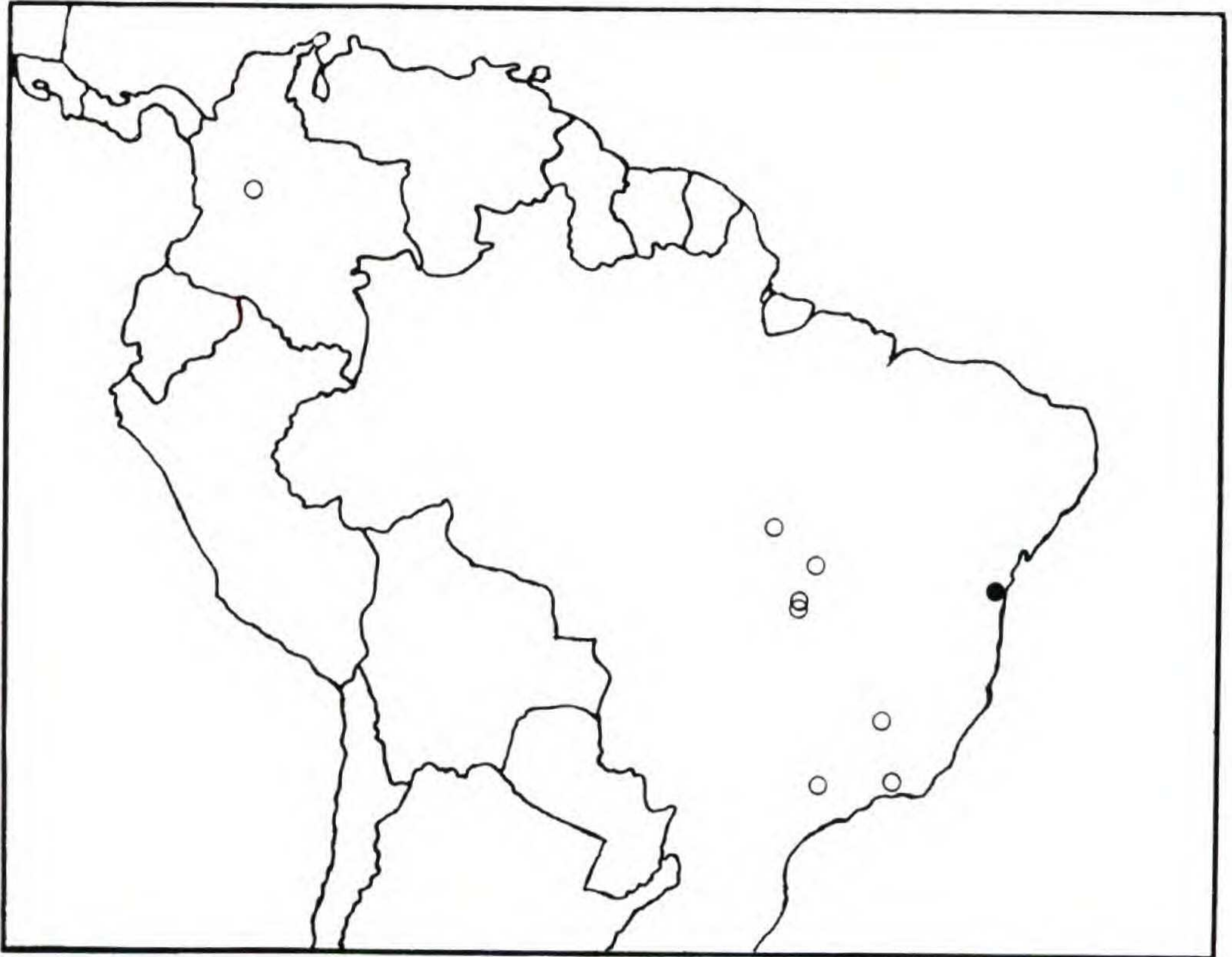


Fig. 23. Map of South America showing distribution of *Melampodium divaricatum* (dot), and *M. paniculatum* (circles).

by Coleman (1970)¹⁴. I have examined the cited voucher specimens, and due to an absence of significant morphological differences between the $n = 18$ and $n = 27$ cytotypes, it seems best at this time to consider these chromosomally distinct populations as simply polyploid races of a single species. It is interesting to note, however, that the tetraploid counts of $n = 18$ prevail in Central America while the chromosomally derived hexaploid populations of $n = 27$ are found only in Brazil where *M. paniculatum* probably has been recently introduced by man. *M. paniculatum* thus joins *M. cinereum*, *M. dicoelocarpum* and *M. leucanthum* as the fourth species in the genus known to have intraspecific euploidy.

¹⁴These new counts actually were listed as $n = 26-27$ and $n = 26$. In recent correspondence regarding these counts, however, Dr. Coleman states that "On restudying the slide, I have decided that the correct number of the material I counted is $n = 27$."

REPRESENTATIVE SPECIMENS. **Brazil.** FEDERAL DISTRICT: Córrego Landim, ca 20 km N of Brasilia, 15 Dec 1965, *Irwin, Souza & Santos* 11303 (TEX); Corallino, 1817-21, *Pohl* 1368 [1276] (NY). GOIAS: near Arraias, Apr 1840, *Gardner* 287 (NY). MATO GROSSO: Sta Terezinha, 12 Feb 1948, *Macedo* 1408 (US). MINAS GERAIS: 1838, *Clausen* s.n. (F, NY [2], US); Belo Horizonte, Pampulha, Feb 1945, *Williams* 5643 (UC, US). RÍO DE JANEIRO: Río de Janeiro, Feb 1882, *Glaziou* 12794 (K). SÃO PAULO: São João de Boa Vista, 6 Sep 1893, *Lofgren & Edwall* 16695 (US). **Colombia.** CUNDINAMARCA: Bogotá, *Triana* 1331 (NY, US). **Costa Rica.** CARTAGO: 24 Aug 1924, *Torres* 50 (US). GUANACASTE: coffee plantations of San Francisco de Guadalupe, Jul 1892, *Pittier* 6963 (GH); Hatillo, 4 Jan 1935, *Solís* 52 (F). HEREDIA: Río Virilla on hwy to Heredia, 1 Dec 1937-1 Jan 1938, *Allen* 585 (F); Río Virilla near La Uruca, Aug 1888, *Pittier* 429 (F, GH); Río Virilla near San Juan, Jun 1896, *Tonduz* 10144 (US [2]). SAN JOSÉ: San José, 4 Sep 1938, *Orozco* 260 (F); vicinity of San José, 6 Nov 1938, *Orozco* 418 (F); vicinity of Las Pavas, 29 Feb 1924, *Standley* 36058 (US); vicinity of San José, Feb 1924, *Standley* 38971 (US); Desamparados, 27 Jun 1923, *Stevens* 136 (US). **El Salvador.** AHUACHAPÁN: vicinity of Ahuachapán, 9-27 Jan 1922, *Standley* 20260 (GH), 16-25 Jan 1947, *Standley & Padilla* 2755 (F). LA LIBERTAD: Finca Paraíso, ¼ mi S of Sta Tecla, 14 Jan 1946, *Carlson* 106 (F, UC, US); Sta Tecla, 20 Jul 1941, *García* 51 (UC). SAN SALVADOR: Volcán de San Salvador, Apr 1922, *Calderón* 459 (GH, NY, US); San Salvador, 1922, *Calderón* 779 (GH, NY, US); vicinity of San Salvador, 30 Mar-24 Apr 1922, *Standley* 22687 (GH, US); Volcán de San Salvador, 7 Apr 1922, *Standley* 22864 (GH, NY, US); San Salvador, Nov 1906, *Velasco* 8946 (US). SANTA ANA: Cerro Miramundo, above Hacienda Los Planos, NE of Metapán, 25 Feb 1946, *Carlson* 873 (F); Finca of Los Naranjos, E of Cerro de los Naranjos, 27 Apr 1942, *Tucker* 1313 (F, NY, UC, US). SAN VICENTE: vicinity of San Vicente, 7-14 Feb 1947, *Standley & Padilla* 3630 (F). **Guatemala:** ALTA VERAPAZ: ca 4 mi NE of San Pedro Carchá, 12 Jul 1960, *King* 3329 (DS, NY, TEX, UC, US); 28 mi E of San Miguel Uspantán, 28 Jul 1966, *Stuessy* 589 (TEX); 1 mi NE of San Pedro Carchá, 29 Jul 1966, *Stuessy* 594 (TEX); Cobán, Jul 1885, *Tuerckheim* 761 (US). Mar 1903, 8417 (F, GH, NY, US). CHIMALTENANGO: near Río Pixcayó between Chimaltenango & San Martín Jilotepeque, 3 Feb 1939, *Standley* 64303 (F, NY); Finca La Alameda near Chimaltenango, 11-22 Dec 1940, *Standley* 79869 (F). EL QUICHÉ: Nebaj, 19 Nov 1934, *Skutch* 1709 (F, GH); 4 mi E of Cunén, 28 Jul 1966, *Stuessy* 585 (TEX); 11 mi E of San Miguel Uspantán, 28 Jul 1966, *Stuessy* 587 (TEX). ESCUINTLA: Finca Monterrey, Volcán de Fuego, 5 Feb 1939, *Standley* 64595 (F, NY); Los Diamantes, 9 Mar 1896, *Volkem* 2564 (GH, NY). GUATEMALA: near Finca La Aurora, 1938-39, *Aguilar* 322 (F). HUEHUE-

TENANGO: ca 3 mi S of Huehuetenango, 18 Jul 1960, *King* 3417 (DS, NY, TEX, UC, US); vicinity of Cuilco near Río Cuilco, 17 Aug 1942, *Steyermark* 50773 (F, GH); 2 mi S of Huehuetenango, 26 Jul 1966, *Stuessy* 578 (TEX); 1 mi W of Aguacatán, 27 Jul 1966, *Stuessy* 582 (TEX); Chaculá, 20 Aug 1896, *Volkem* 2774 (GH, NY, US). JALAPA: vicinity of Jalapa, 7-18 Nov 1940, *Standley* 76429 (F); between Jalapa & San Pedro Pinula, 12 Nov 1940, *Standley* 77073 (F); mts near Chahuite, NW of Jalapa, 16 Nov 1940, *Standley* 77440 (F); between Jalapa & Montaña Miramundo, 7 Dec 1939, *Steyermark* 32847 (F). QUEZALTENANGO: vicinity of San Francisco de Miramar, Costa Cuca, Apr 1905, *Pittier* 57 (F, US), *Pittier* 60 (F, US); between Colomba & Las Mercedes, 20 Feb 1941, *Standley* 87933 (F); San Francisco Miramar, 15 Mar 1921, *Tonduz & Rojas* 203 (US). RETALHULEU: *Finca Helvetia*, 6 May 1937, *Muenschner* 12467 (F). SACATEPÉQUEZ: Antigua, 12 Sep 1959, *O. & I. Degener* 26504 (US); Antigua, 13 Feb 1905, *Kellerman* 4501 (F, US); Antigua, Apr 1890, *Smith* 2334 (US); near Antigua, Nov 1938-Feb 1939, *Standley* 60326 (F, NY); Barranca above Dueñas, 21 Jan 1939, *Standley* 63265 (F, NY). SAN MARCOS: Río Cabús near Malacatán, 15 Mar 1939, *Standley* 68866 (F). SANTA ROSA: near Cerro Redondo, 20 Dec 1938, *Standley* 60413 (F); La Joya de Limón, E of Cuilapa, 25 Nov 1940, *Standley* 78268 (F). SOLOLÁ: Panajachel, near Lake Atitlán, 11 Sep 1959, *O. & I. Degener* 26559 (US); behind Lago de Atitlán near Panajachel, 5 Jul 1960, *King* 3242 (DS, NY, TEX, UC, US). SUCHITEPÉQUEZ: *Finca Moca*, 27 Oct 1934, *Skutch* 1550 (GH). Honduras. CHOLUTECA: vicinity of San Marcos de Colón, 12-22 Jan 1949, *Standley* 15756 (F). COMAYAGUA: vicinity of Siguatepeque, 14-27 Feb 1928, *Standley* 56290 (US), 56522 (F, US), 25 Mar-5 Apr 1947, *Standley & Chacón* 6625 (F), 6660 (F); Rittenhouse's hacienda, 30 Jun 1936, *Yuncker, Dawson & Youse* 5519 (F, GH). EL PARAÍSO: Güinope, Dec 1943, *Valerio* 1662 (F). INTIBUCÁ: vicinity of La Esperanza & Intibucá, 31 Jan-12 Feb 1950, *Standley* 25149 (F). MORAZÁN: Río Yeguaré, 22 Jul 1948, *S. F. Glassman* 2003 (F, NY), 26 Aug 1951, *Williams* 18257 (F); near Río Yeguaré, below El Zamorano, 10 Aug 1947, *Standley* 12105 (F); Cerro de Uyuca between Las Flores & Tatumbla, 17 Aug 1949, *Standley* 22718 (F); La Leona, Tegucigalpa, 6 Sep 1951, *Standley* 28678 (F); Zamorano, 7 Jan 1946, *Valerio* 3735 (F, GH). OLANCHO: vicinity of Juticalpa, 5-16 Mar 1949, *Standley* 17710 (F). Mexico. CHIAPAS: Tenejapa, Pokolum, 10 Jul 1964, *Breedlove* 6085 (DS, F); Chamula, Toh Tik on rd to Chenalho, 12 Dec 1964, *Breedlove* 7861 (DS, F); Los Lagos, 3 mi NW of Rancho San José, 18 Jan 1952, *Carlson* 2254 (F).

III. **Melampodium** section **Serratura** Stuessy, sect. nov.

Herbae annuae radicibus palmaribus; folia rhombica vel deltoidea (raro anguste ovata), petiolata, marginibus serratis (raro integris); involucrum extimum cupulatum vel interdum patens, bracteis 5, marginibus herbaceis; ovaria flosculi disci ovoidea, minus quam 0.7 mm longa, rudimentales (Figs. 3 & 4); fructus apice fere laeves vel moderate sculpti et sine cucullis, vel complanata abaxiali arista (*M. tepicense*); chromosomatum numerus basicus, $x = 12$. Species 26-30. Typus: *Melampodium divaricatum* (Rich. in Pers.) DC.

26. **Melampodium divaricatum** (Rich. in Pers.) DC. Prodr. 5:520. 1836.

Dysodium divaricatum Rich. in Pers. Syn. 2:489. 1807. non Hort. ex DC. 1836. TYPE: COLOMBIA: "Gairam, prope St. Martham," 1785-89, *L. C. M. Richard* s.n. (Lectotype chosen, P!; isotype, P!; photograph of holotype, OS! TEX!; photograph of P isotype, OS!).

Wedelia ovatifolia Willd. Enum. Suppl. 61. 1814. TYPE: source of seed unknown, apparently grown in Bot. Gard. Berlin, "2421" (Holotype, B?; isotype, W!; photograph of W isotype, OS! TEX!; photograph of probable G-DC isotype, IDC 800. 928: I. 4!).

Alcina ovatifolia (Willd.) Jacq. f. Eclog. Pl. 1:115. t. 78. 1815.

Wedelia minor Hort. ex Hornem. Enum. Hort. Hafn. 2:855. 1815. TYPE: introduced into the Bot. Gard. Copenhagen in 1812 from Berlin Bot. Gard., source of seed unknown (Lectotype, C!; isotypes, C [2]!; photograph of lectotype, OS! TEX!).

Alcina ovalifolia Lag. Gen. et Sp. Nov. 32. 1816. TYPE: "NOVA HISPANIA" [MEXICO]: seeds cultivated and grown in Bot. Gard. Madrid, 1805, *M. Sessé* s.n. (Holotype, MA!; isotype, G!; photograph of holotype, OS! TEX!; photograph of G isotype, OS! TEX!).

Melampodium paludosum H.B.K. Nov. Gen. Sp. 4:237. 1820. TYPE: PANAMA: "in humidis prope ostia fluminis sinu, juxta litora Dariensis," Mar 1801, *F. H. A. von Humboldt & A. J. Bonpland* 1421 (Holotype, P; isotype, P!; photograph of P isotype, OS! TEX!).

Melampodium ovatifolium Rchb. Icon. Bot. Exot. 30. t. 42. 1824. *nom. superfl.* Based on type of *Dysodium divaricatum* Rich. in Pers.

Melampodium berterianum Spreng. Syst. Veg. 3:619. 1826. TYPE: "IND. OCC." [COLOMBIA]: near Sta Martha, C. G. Bertero s.n. (Holotype, P!; probable isotype, GH!; photograph of holotype, OS! TEX [2]! US!; photograph of G-DC isotype, IDC 800. 928: I. 3!).

Alcina minor Cass. Dict. Sc. Nat. 59:243. 1829. TYPE: MEXICO: cultivated in Bot. Gard. Paris (Holotype, P?).

Dysodium radiatum Hort. ex Desf. Cat. Hort. Paris. ed. 3. 182. 1829. *pro syn.*

Melampodium pumilum Benth. Pl. Hartw. 64. 1840. TYPE: MEXICO: exact locality unknown, 1830, *G. J. Graham* 5 (Holotype, K!; isotype, GH!; photograph of holotype, OS! TEX! US!).

Melampodium tenellum Hook. & Arn. var. *flaccidum* Benth. Bot. Voy. Sulphur 115. 1845. TYPE: MEXICO: Nayarit, Tepic, 1844, *A. Sinclair* s.n. (Lectotype chosen, K!; isotype, K!; photograph of lectotype, US [3]!).

Melampodium divaricatum (Rich. in Pers.) DC. var. *macranthum* Schlecht. Linnaea 24:198. 1851. TYPE: GUATEMALA: locality and date unknown, seeds collected and grown in Bot. Gard. Turin, *J. von Warscewicz* s.n. (Holotype, HAL; isotype, W!; photograph of W isotype, OS! TEX!).

Melampodium flaccidum (Benth.) Benth. in Oerst. Kjoeb. Vidensk. Meddel. 5-7:86. 1852.

Melampodium copiosum Klatt, Engl. Bot. Jahrb. 8:41. 1887. TYPE: GUATEMALA: Alta Verapaz, near Cobán, 1300

m, Feb [May?] 1882, *F. C. Lehmann* 1434 (Holotype, GH!; isotypes, F! G [2]! K! US!; photograph of K isotype, US!; photograph and fragment of K isotype, US!).

Melampodium panamense Klatt, Engl. Bot. Jahrb. 8:42. 1887. TYPE: PANAMA: "ad margines silvarum," 20 Aug 1880, *F. C. Lehmann* 69 (Holotype, GH!; isotypes, G! K! US!; photograph of K isotype, US!).

Spilanthus guatemalensis Vatk. ex J. D. Smith, Enum. Pl. Guat. 1:23. 1889. *nom. nud.* Based on *H. von Tuerckheim* 124 (F! GH! NY! US [2]!).

Melampodium rhombifolium Sessé & Moc. Fl. Mexic. ed. 2. 195 [first on page]. 1894. *nom. illegit. non* Sessé & Moc. 1890. *nec* Sessé & Moc. [second on page]. 1894. TYPE: MEXICO: Michoacán, Temascaltepec, Jul 1790-1791, *M. Sessé et al.* "3983" (Holotype, MA!; isotype, F!; photograph of holotype, OS! TEX!).

Eleutheranthera divaricata (Rich. in Pers.) Millsp. Field Col. Mus. Pub. Bot. 1:53. 1895.

Annual herbs, 15-100 cm tall. Stems erect, with lateral stems sometimes decumbent and rooting at the nodes, 1.3-6 mm diam, glabrous to pubescent with hairs up to 0.7 mm long. Peduncles 1.5-13.5 cm long. Leaves with petioles 2-20 mm long, ovate to rhombic (younger leaves approaching lanceolate), 1.5-15 cm long, 0.5-9.5 cm wide, at apex acuminate to obtuse, at base attenuate (rarely obtuse to cordate), with both surfaces infrequently strigillose with hairs 0.2 mm long; margin entire to coarsely dentate-crenate. Heads 5-10 mm tall, 10-21 mm diam. Outer involucre cupulate, 6-9 mm diam; bracts 5, connate 1/3-1/4 their length, imbricate, ovate-orbiculate, 3.5-6 mm long, 3-5 mm wide, at apex obtuse, with abaxial surface glabrous to tomentose near peduncle; margin herbaceous, near base tomentose. Fruits 2.8-4 mm long, with lateral surfaces with diagonal striations and enlarged margins. Ray florets 8-13; ligules yellow-orange, oblong-elliptic, 3.5-7 mm long, 1.6-3 mm wide. Disc florets 40-70; yellow-orange, 2 mm diam, with throat

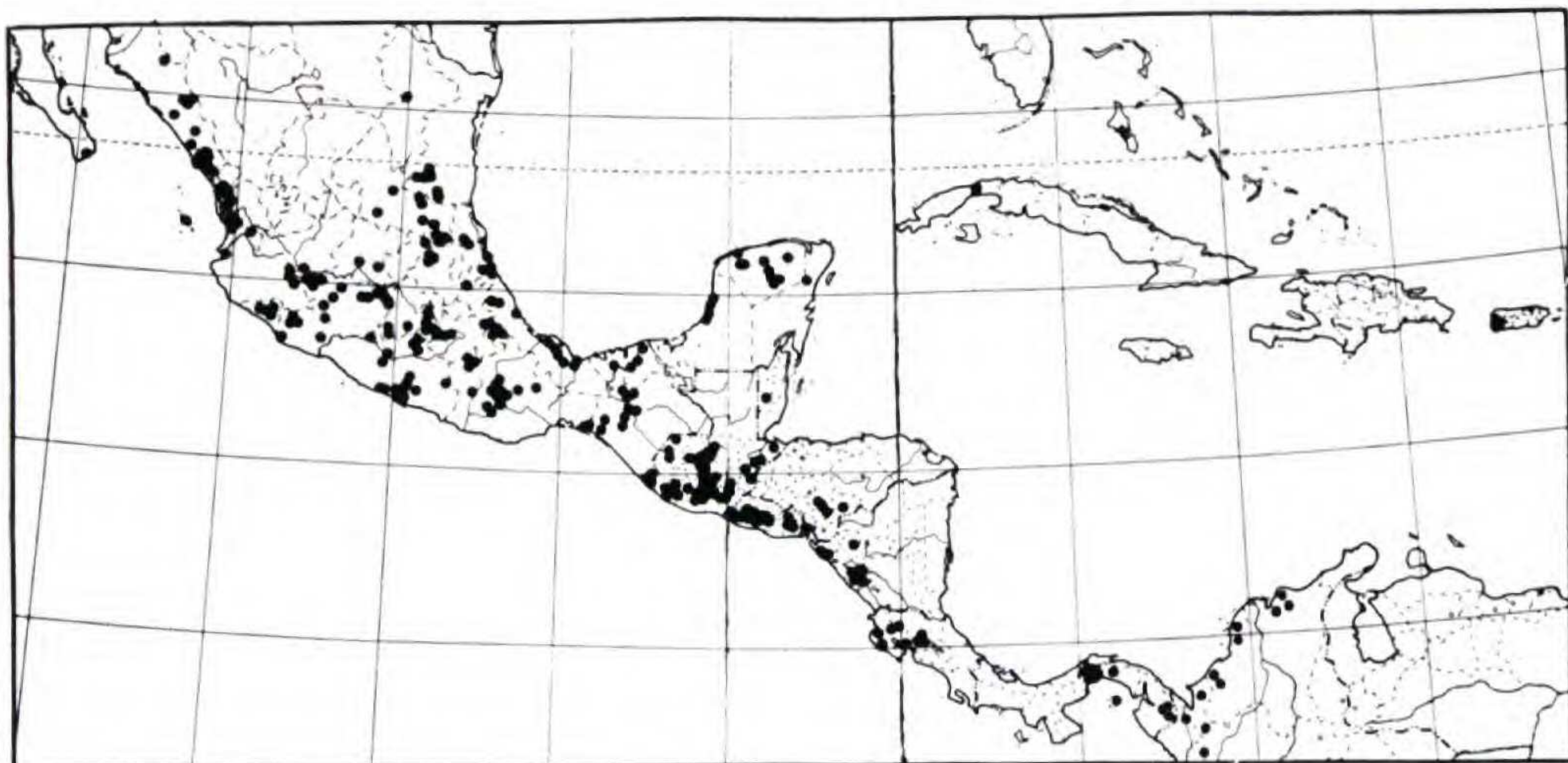


Fig. 24. Map of Mexico, Central America, northern South America, and the Caribbean region showing distribution of *Melampodium divaricatum*. See Fig. 23 for the one Brazilian locality. Collections from Burma and the Virgin Islands not shown.

1 mm and tube 0.5 mm long. Paleae obovate, 2.5 mm long, 0.9 mm wide; apex yellow-orange, with margin dentate-erose; midrib weak, glabrous. Chromosome number, $n = 12$.

Very widely spread in many subtropical habitats throughout Mexico, Central America, and northwestern Colombia, also in eastern Brazil, and introduced into Cuba, Burma, Puerto Rico and the Virgin Islands (Figs. 23 & 24), 15-2990 m. Flowering dates, Jan-Dec.

This is the most widespread and weedy species of the genus. Although field and garden studies have shown leaf shape to be extremely variable, which partially accounts for the many synonyms accorded this taxon, the morphology of the outer involucre bracts is very constant and allows the species to be recognized without difficulty. One plant from Nicaragua, *Stuessy* 615, has fruits with an anomalous hooded condition; other plants from the same population are hoodless.

REPRESENTATIVE SPECIMENS. **Brazil.** BAHÍA: 1842, *Glocker* 19 (US); Marau, 22 Jan 1965, *Pereira* 9616 & *Pabst* 8505 [34972] (F). **British**

Honduras. EL CAYO: El Cayo, near Camp 6, 11 Mar 1938, *Gentle* 2325 (ARIZ, F, GH, NY). **Burma.** MANDALA: Maymyo, Nov 1950, *White* 100 (US). **Colombia.** ANTIOQUÍA: near Dabeiba, 20 Dec 1947, *Barkley & Gutiérrez* 1777 (F). BOLÍVAR: vicinity of Turbaco, 6-22 Nov 1926, *Killip & Smith* 14169 (F, NY, US). CÓRDOBA: W of Montería, near Río Sinu, 6 Jan 1949, *Cervantes, Molina & Barkley* 19Bo061 (US). MAGDALENA: Sta Marta, Bonda, 9 Nov 1898-1899, *Smith* 514 in part (NY [3], UC); Sta Marta, Jul 1898-1901, *Smith* 514 in part (F, RSA, SMU, TEX, UC, US). **Costa Rica.** ALAJUELA: between San Josecito & La Garita, 18 Aug 1963, *Jiménez* 1073 (F, US). GUANACASTE: Nicoya, Dec 1899, *Tonduz* 13615 (NY, US). PUNTARENAS: 21 km SE of Puntarenas, near bridge over Río Barranca, 20 Aug 1938, *Stork & Morrison* 8920 (GH, UC). **Cuba.** HAVANA: Vedado, shore of Ariguanabo River, San Antonio de los Baños, 3 Sep 1939, *Léon, Victorín & Alain* 17344 (NY). **El Salvador.** AHUACHAPÁN: vicinity of Ahuachapán, 9-27 Jan 1922, *Standley* 19722 (GH, US). LA LIBERTAD: Finca Paraíso, ¼ mi S of Sta Tecla, 14 Jan 1946, *Carlson* 79 (F, UC, US). MORAZÁN: Río San Miguel opposite Barrios Mine, ca 5 km W of Montecristo, 19 Dec 1941, *Tucker* 585 (F, NY, UC, US). SAN MIGUEL: 39 mi W of La Unión, 7 Aug 1966, *Stuessy* 623 (TEX). SAN SALVADOR: 18 mi E of San Salvador, 2 Aug 1966, *Stuessy* 611 (TEX). SANTA ANA: 4 mi SE of Sta Ana, 2 Aug 1966, *Stuessy* 609 (TEX). SAN VICENTE: vicinity of San Vicente, 2-11 Mar 1922, *Standley* 21648 (GH, NY, US). SONSONATE: vicinity of Sonsonate, 18-27 Mar 1922, *Standley* 21789 (GH, NY, US). **Guatemala.** ALTA VERAPAZ: ca 2 mi E of Cobán, 12 Jul 1960, *King* 3322 (DS, NY, TEX, UC, US); 28 mi E of San Miguel Uspantán, 28 Jul 1966, *Stuessy* 588 (TEX); 1 mi NE of San Pedro Carchá, 29 Jul 1966, *Stuessy* 592 (TEX). BAJA VERAPAZ: ca 1 mi S of Rabinal, 14 Jul 1960, *King* 3359 (DS, NY, TEX, UC, US). CHIMALTENANGO: San Martín J., 1928, *Morales* 1221 (F). CHIQUIMULA: Montaña Nonojá, 3-5 mi E of Camotán, 11 Nov 1939, *Steyermark* 31670 (F). EL PROGRESO: between Finca Piamonte & Finca San Miguel, 9 Feb 1942, *Steyermark* 43745 (F, UC). EL QUICHÉ: 11 mi E of San Miguel Uspantán, 28 Jul 1966, *Stuessy* 586 (TEX). ESCUINTLA: 9 mi NE of Escuintla, 8 Aug 1966, *Stuessy* 624 (TEX). GUATEMALA: ca 4 mi E of Guatemala, 9 Jul 1960, *King* 3249 (DS, NY, TEX, UC, US). HUEHUETENANGO: Chacula, 29 Jul 1896, *Volkem* 3013 (GH, NY, US). IZABAL: Cristina, 23 May 1919, *Blake* 7632 (US). JALAPA: vicinity of Jalapa, 7-18 Nov 1940, *Standley* 77149 (F). JUTIAPA: 25 mi E of Cuilapa, 2 Aug 1966, *Stuessy* 605 (TEX); 8 mi NE of Jutiapa, 2 Aug 1966, *Stuessy* 608 (TEX). QUEZALTENANGO: Colomba, 31 Dec 1934, *Skutch* 2041 (F, GH). RETALHULEU: 1 mi W of jct rtes 2 & 9S, N of Retalhuleu, 10 Aug 1966, *Stuessy* 625 (TEX). SANTA ROSA: Volcán Jumaytepeque, Dec 1892, *Heyde et Lux* 4213 (F, GH, NY, US [2]). SUCHITEPÉQUEZ: Mazatenango, 28 Feb 1905,

Kellerman 4958 (SMU, US). ZACAPA: Gualán, 18 Jan 1905, *Deam* 247 (F, GH, NY, US). HONDURAS. EL PARAÍSO: Llano de Lizapa, 24 Aug 1948, *Molina* 1082 (F). FRANCISCO MORAZÁN: near San Francisco along Yeguaré River, 16 Nov 1947, *Williams & Molina* 13398 (F, GH). VALLE: Amapala, 11 Sep 1945, *Valerio* 3341 (F [2]). MEXICO. BAJA CALIFORNIA: San José del Cabo, 12 Sep 1890, *Brandege* 301 (UC). CAMPECHE: 1 mi W of Champotón, 18 Jul 1966, *Stuessy* 532 (TEX); 14 mi N of Champotón, 18 Jul 1966, *Stuessy* 534 (TEX); 14 mi E of Campeche, 18 Jul 1966, *Stuessy* 535 (TEX); 12 mi S of Campeche, 22 Jul 1966, *Stuessy* 545 (TEX). CHIAPAS: ca 15 mi S of Suchiate, 20 Jul 1960, *King* 3434 (DS, NY, RSA, TEX, UC); 19 mi S of Pichucalco, 23 Jul 1966, *Stuessy* 550 (TEX). COLIMA: 4 mi E of Colima, 25 Aug 1966, *Stuessy* 723 (TEX); 7 mi NW of rte 110 on rd to Alzada, 25 Aug 1966, *Stuessy* 725 (TEX); Alzada, 25 Aug 1966, *Stuessy* 728 (TEX). DISTRITO FEDERAL: Sta Rosa, 4 Oct 1952, *Matuda* 26621 (US). GUANAJUATO: valley near Irapuato, 20 Sep 1889, *Pringle* 2819 (F, GH). GUERRERO: vicinity of Acapulco, Oct 1894-Mar 1895, *Palmer* 186 (F, GH, NY, US); 4 mi S of Taxco, 17 Aug 1961, *Powell & Edmondson* 756 (F, TEX); S limits of Petaquillas, 27 Aug 1965, *Stuessy* 365 (TEX). HIDALGO: Jacala, 25 Jun 1939, *Chase* 7122 (F). JALISCO: Río Cuvianes, 13 Jun 1892, *Jones* 273 (POM [2], US). MEXICO: Temascaltepec, 2 Sep 1932, *Hinton* 1520 (NY). MICHOACÁN: ca 45 mi W of Morelia, 5 Aug 1960, *King* 3634 (DS, NY, RSA, TEX, UC); 16 mi NW of Zitacuaro, 19 Aug 1966, *Stuessy* 677 (TEX); S city limits of Uruapán, 21 Aug 1966, *Stuessy* 702 (TEX). MORELOS: ca 11 mi S of Cuernavaca, 14 Mar 1961, *King* 4164 (F, NY, TEX, UC, US); 35.5 mi NW of Izúcar de Matamoros, 25 Aug 1965, *Stuessy* 348 (TEX); 6 mi NW of Cuautla, 25 Aug 1965, *Stuessy* 351 (TEX); 10 mi S of Cuernavaca, 26 Aug 1965, *Stuessy* 359 (TEX). NAYARIT: ca 16 mi NW of Ixtlán del Río, 10 Aug 1960, *King* 3678 (DS, NY, TEX, UC, US); 1 mi N of Tepic, 27 Aug 1966, *Stuessy* 743 (TEX); 10 mi NW of jct rte 16 & rd to Tuxpán, 27 Aug 1966, *Stuessy* 746 (TEX). NUEVO LEÓN: Villa de Santiago, Las Adjuntas, 21 Jun 1940, *Leavenworth* 157a (F). OAXACA: ca 1 mi W of the Oaxaca-Chiapas border on rte 190, 9 Jun 1960, *King* 2743 (DS, NY, TEX, UC, US); 0.7 mi N of Huajuapán de León, 24 Aug 1965, *Stuessy* 342 (TEX); 40 mi S of Zimatlán, 13 Aug 1966, *Stuessy* 645 (TEX). PUEBLA: just SE of the Morelos-Puebla border on rte 115, 19 Jun 1960, *King* 2917 (DS, NY, TEX, UC, US); Asunción de Chila, 25 Aug 1965, *Stuessy* 345 (TEX). QUERÉTARO: 2 mi W of Landa, 13 Dec 1960, *Crutchfield & Johnston* 6120b (TEX). QUINTANA ROO: Coba, Jun-Jul 1938, *C. & A. Lundell* 7879 (US). SAN LUIS POTOSÍ: ca 10 mi S of Tamazunchale, 23 Mar 1961, *King* 4239 (F, NY, TEX, UC, US); Cardenas, 3 Nov 1891, *Pringle* 3923 (DS, F, GH, NY, UC [2], US); 2 mi off rte 80 on rd to Quadalcazar, 10 Aug 1965, *Stuessy* 282 (TEX). SINALOA: ca 15 mi N of

Rosario, 13 Aug 1960, *King* 3711 (DS, NY, RSA, TEX, UC); 4.5 mi N of Escuinapa, 4 Sep 1965, *Stuessy* 403 (TEX). TABASCO: 57 mi SE of Coatzacoalcos, 17 Jul 1966, *Stuessy* 527 (TEX); 84 mi E of Coatzacoalcos, 17 Jul 1966, *Stuessy* 528 (TEX); 5 mi W of Villa Hermosa, 23 Jul 1966, *Stuessy* 547 (OS, TEX); 37 mi S of Villa Hermosa, 23 Jul 1966, *Stuessy* 548 (TEX). TAMAULIPAS: ca 4-5 mi W of Ciudad Mante, 18 Feb 1961, *King* 3833 (F, NY, TEX, US); 4 mi S of Juamave, 6 Jul 1949, *Stanford, Taylor & Lauber* 2313 (DS, GH, NY, RSA, SMU, TEX, UC, US [2]); 1 mi E of Gómez Farías, 8 Jul 1967, *Stuessy* 829 (TEX). VERACRUZ: ca 25 mi SE of Poza Rica, 10 Mar 1961, *King* 4138 (F, NY, TEX, US); 23.2 mi SE of Alvarado, 21 Aug 1965, *Stuessy* 318 (TEX); 12 mi S of Tantoyuca, 6 Jul 1966, *Stuessy* 473 (TEX); 49 mi SE of Catemaco, 16 Jul 1966, *Stuessy* 526 (TEX). YUCATÁN: Izamal, 1895, *Gaumer* 563 (F, GH [2], NY [2], US); Progreso, 20 Jul 1966, *Stuessy* 543 (TEX). Nicaragua. CHINANDEGA: vicinity of Chichigalpa, 12-18 Jul 1947, *Standley* 11226 (F). GRANADA: Volcán Mombacho, 20 Feb 1903, *Baker* 2482 (GH, POM, UC, US); NE limits of Granada, 6 Aug 1966, *Stuessy* 620 (TEX). MANAGUA: 1 mi SE of Managua, 5 Aug 1966, *Stuessy* 616 (TEX); 5 mi E of Managua, 6 Aug 1966, *Stuessy* 621 (TEX). MASAYA: near Masaya, SW slopes of Santiago Volcano, 5 Jul 1923, *Maxon* 7694 (US). MATAGALPA: Sebaco, 5 Aug 1966, *Stuessy* 614 & 615 (TEX). PUNTARENAS: 21 km SE of Puntarenas, 20 Aug 1938, *Stork & Morrison* 8920 (GH, UC). Panama. CANAL ZONE: vicinity of Frijoles, 9 Jul 1962, *King* 5226 (UC, US). DARIÉN: trail between Pinogana & Yavisa, 17 Mar 1937, *Allen* 241 (GH [3], NY, US). PANAMÁ: near Arraiján, 21 Jul 1938, *Woodson, Allen & Seibert* 1370 (GH, NY, US). PEARL ARCHIPELAGO: San José Is, Naval Station, 22 Jul 1945, *Erlanson* 500 (DS, GH, TEX, US). Puerto Rico: Mayaguez, 14-15 Feb 1914, *Britton & Cowell* 1561 (NY). Virgin Islands. ST. CROIX: near Mt Pleasant, 19 Aug 1896, *Ricksecker* "s" (F, NY).

27. *Melampodium costaricense* Stuessy, *Brittonia* 22:118. f. 7. 1970. TYPE: COSTA RICA: Alajuela, Naranjo, Cerro del Espíritu Santo, 1200 m, 11 Jul 1941, *A. Smith* 2922 (Holotype, F!).

Annual herbs, 15-35 cm tall. Stems erect, with lateral stems often decumbent, 0.8-4 mm diam, glabrous to tomentose with hairs 0.3 mm long. Peduncles 0.5-7 cm long. Leaves with petioles 4-25 mm long, ovate-rhombic (younger leaves approaching lanceolate), 2.5-7 cm long, 1.5-5.5 cm wide, at apex acuminate to obtuse, at base obtuse-attenuate, with upper surface infrequently strigose with hairs 0.6 mm

long, with lower surface glabrous; margin obscurely to coarsely serrate. Heads 4-5 mm tall, 6-7 (10) mm diam. Outer involucre cupulate, 5-10 mm diam; bracts 5, connate 1/3-1/4 their length, imbricate, ovate-orbiculate, 2.2-5 mm long, 2-4 mm wide, at apex obtuse, with abaxial surface glabrous; margin herbaceous, ciliate with hairs 0.3 mm long. Fruits 2.9-3.1 mm long, with lateral surfaces with diagonal ridges and enlarged margins. Ray florets 5-8; ligules yellow-orange, elliptic, 1-1.5 mm long, 0.5-1 mm wide. Disc florets 15-25; corollas yellow, 1.1 mm diam, with throat 0.8 mm and tube 0.5 mm long. Paleae oblong-elliptic, 2 mm long, 0.7 mm wide; apex yellow, with margin erose; midrib weak, glabrous. Chromosome number, $n = 25 \pm 1$.

Tropical habitats in British Honduras, Nicaragua, Costa Rica and Panama of Central America, and Colombia, South America (Fig. 25), 0-1980 m. Flowering dates, Jan-Dec.

REPRESENTATIVE SPECIMENS. **British Honduras.** EL CAYO: El Cayo, Jun-Aug 1936, *Lundell* 6107 (F, GH, NY, US). **Colombia.** CUNDINAMARCA: Caqueza to Río Sananie, 24 Aug 1917, *Pennell* 1335 (NY). **Costa Rica.** ALAJUELA: banks of the Río Rosales y Carret, 8 Dec 1933, *Brenes* 17471 (NY); San Pedro de San Ramón, 29 Jul 1935, *Brenes* 20572 (F). CARTAGO: above Tres Ríos, 19 Mar 1965, *Godfrey* 67156 (FSU); Turrialba, Instituto Interamericano de Agrícolas, 20 Aug 1962, *King* 5348 (TEX, UC, US); Finca Las Concavas, 7-8 Dec 1925, *Standley* 41531 (US); rr below Turrialba, 9 Jun 1928, *Stork* 2486 (F, US). GUANACASTE: Hatillo, 4 Jan 1935, *Solís* 56 (F). LÍMON: marshes of Suerre & Dos Bocas, 3 Oct 1951, *Shank & Molina* 4236 (F, GH); Hamburg Finca, on the Río Reventazon below Cairo, 19 Feb 1926, *Standley & Valerio* 48814 (US). SAN JOSÉ: Alajuelita, 8 Sep 1946, *Echeverría* 628 (F); San Isidro, 26 Feb 1965, *Godfrey* 6664 (FSU); San Pedro de Montes de Oca, 2 Aug 1938, *Orozco* 294 (F); El General [San Isidro del], Jan 1939, *Skutch* 3968 (GH, K, NY, US); between San Pedro de Montes de Oca & Curridabat, 2 Feb 1924, *Standley* 32757 (US); San José, Feb 1924, *Standley* 39021 (US). **Nicaragua.** GRANADA: near Granada, 1845-48, *Oersted* 9010 (photograph of K specimen, US). **Panama.** BOCAS DEL TORO: Changuinola Valley, 15 Mar 1924, *Dunlap* 557 (F, US). CHIRIQUI: 25 mi N of Concepción, 29 Jul 1962, *King* 5290 (TEX, UC, US).

28. **Melampodium dicoelocarpum** Robins. Proc. Amer. Acad. Arts & Sci. 44:619. 1909. TYPE: MEXICO: Guerrero, El Cala-

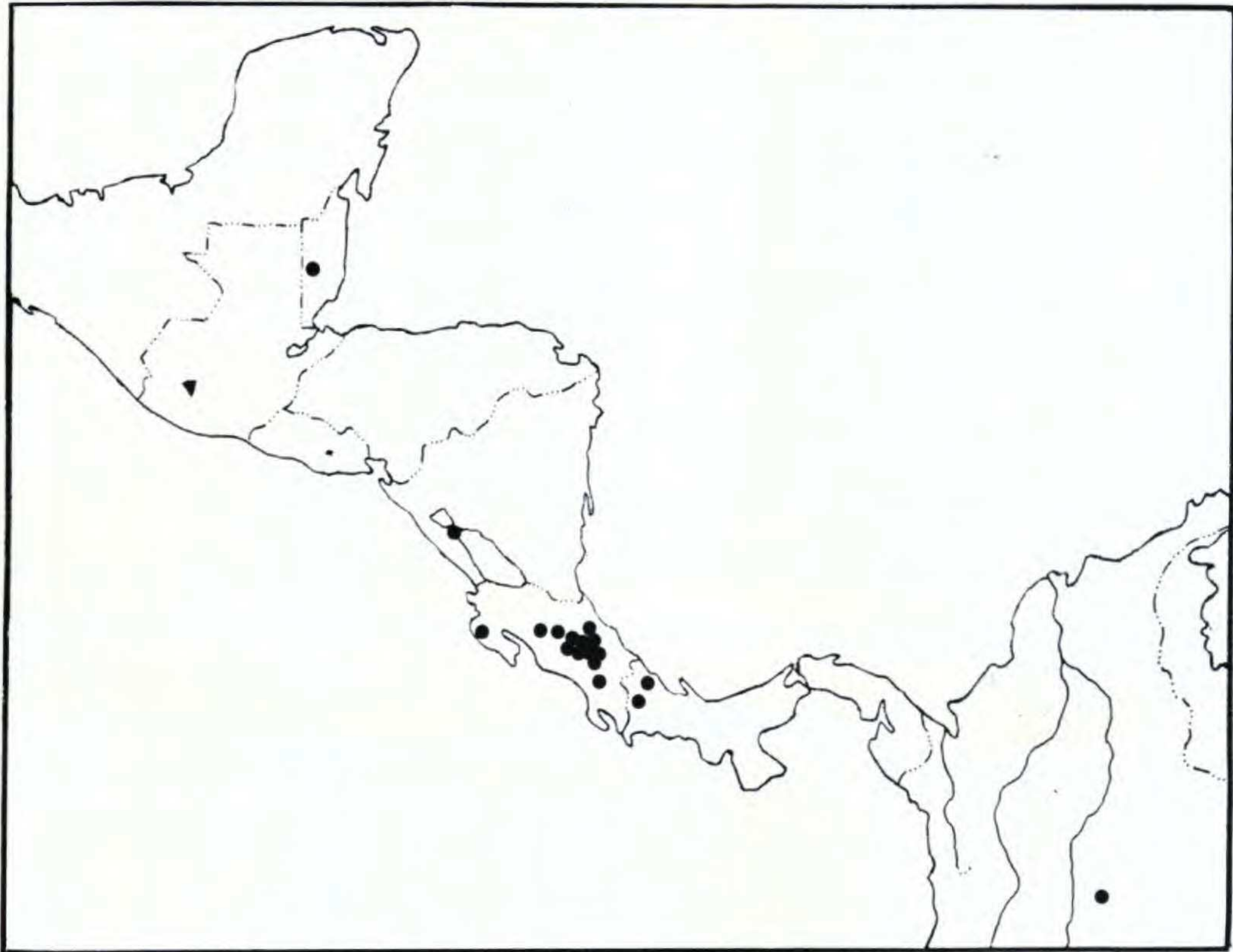


Fig. 25. Map of Central America and neighboring countries showing distribution of *Melampodium costaricense*.

bazal, 300 m, 20 Oct 1898, *E. Langlassé* 482 (Holotype, GH!; isotypes, G! K! P! US!; photograph of K isotype, US!; photograph of US isotype, TEX!).

Annual herbs, 10-50 cm tall. Stems erect, 0.6-1.6 mm diam, glabrous to moderately pilose with hairs 0.3-1.3 mm long. Peduncles deflected, 0.4-7.5 cm long. Leaves with petioles 2-10 mm long, ovate to somewhat deltoid (younger leaves often ovate-lanceolate), 2-6 cm long, 0.7-3 cm wide, at apex acuminate-attenuate, at base obtuse-attenuate, with both surfaces moderately pilose with hairs 1 mm long; margin obscurely to coarsely serrate. Heads 2-4 mm tall, 2.5-8 mm diam. Outer involucre spreading, 2-7 mm diam; bracts 5 (rarely 3 or 4), slightly connate at base, separate, ovate-lanceolate, 1.5-4.5 mm long, 1-2.5 mm wide, at apex acuminate, with abaxial surface moderately strigose with

hairs 0.6-1 mm long; margin herbaceous. Fruits 1.7-3 mm long, with lateral surfaces with 2 deep oval depressions. Ray florets 3-5; ligules yellow-orange, oblong-elliptic, 2.2-2.5 mm long, 1.2-1.8 mm wide. Disc florets 25-35; corollas yellow-orange, 0.8 mm diam, with throat 0.7 mm and tube 0.5 mm long. Paleae oblong-elliptic, 2 mm long, 0.7 mm wide; apex yellow, with margin erose to lacinate; midrib weak, glabrous. Chromosome numbers, $n = 12$ and 23.

Tropical deciduous forests in the Mexican states of Jalisco, Michoacán, Guerrero and México (Fig. 13), 200-1890 m. Flowering dates, Jun-Oct.

The cytological vouchers for the two chromosome levels are morphologically distinguishable, the aneuploid at the tetraploid level being larger in most characters. However, without intensive field and garden studies, it seems premature to propose formal recognition of these forms.

Among all the taxa of *Melampodium*, *M. dicoelocarpum* can be distinguished easily by the two deep oval cavities on the lateral sides of the fruit.

REPRESENTATIVE SPECIMENS. **Mexico.** GUERRERO: Mina, Zihuagio, 17 Oct 1936, *Hinton* 9714 (G, GH, MICH, NY, P, UC, US); Galeana, Atoyac-San Juan, 12 Oct 1939, *Hinton et al.* 14614 (ARIZ, F, GH, NY, US). JALISCO: Tecalitlán, Barranca de San Juan de Díos, ca 15 km E of Pihuamo, 24 Oct 1963, *Feddema* 2204 (MICH). MÉXICO: Temascaltepec, Anonas, 24 Jun 1934, *Hinton et al.* 6334 (GH, MICH, NY). MICHOACÁN: ca 5 mi N of Cotija, 5-9 Oct 1961, *King & Soderstrom* 4646 (MICH, NY, SMU, TEX, UC, US); 25 mi S of Ario de Rosales, 20 Aug 1966, *Stuessy* 693 (TEX); 15 mi S of jct rte 15 on rd to Cotija, *Stuessy* 715 (TEX).

29. *Melampodium tepicense* Robins. Proc. Amer. Acad. Arts & Sci. 44:620. 1909. TYPE: MEXICO: Nayarit, Tepic, 5 Jan-6 Feb 1892, *E. Palmer* 1814 (Holotype, GH!; isotypes, F! NY! US!).

Melampodium cornutum S. F. Blake, Jour. Wash. Acad. Sci. 16:421. 1926. TYPE: MEXICO: Colima, Alzada, 4 Nov 1910, *C. R. Orcutt* 6601 (Holotype, US!; photograph of holotype, TEX!).

Annual herbs, 7-35 cm tall. Stems decumbent to erect, 0.5-1.3 mm diam, mostly glabrous to puberulent with hairs 0.1 mm long. Peduncles 0.8-8 mm long. Leaves with narrowly marginate petioles 1-18 mm long, ovate to rhombic, 0.8-5.7 cm long, 0.7-3.5 cm wide, at apex acute, at base attenuate to obtuse, with both surfaces sparsely strigose with hairs 0.3-1 mm long; margin crenate to serrate, near base entire. Heads 2-3 mm tall, 3-5 mm diam. Outer involucre cupulate, 3.5-7 mm diam; bracts 5, slightly connate at base, separate, elliptic, 2-4 mm long, 1.2-2.2 mm wide, at apex obtuse, with abaxial surface glabrous; margin herbaceous. Fruits 1.6-2 mm long, with lateral surfaces tuberculate to aculeate-reticulate; apex with a flattened abaxial appendage¹⁵, with tapering cirrhous awn up to 4 mm long. Ray florets 3-7; ligules pale-yellow, ovate-oblong, 0.8-1.5 mm long, 0.4-0.8 mm wide. Disc florets 3-7(12); corollas yellow-green, 0.8 mm diam, with throat 0.4 mm and tube 0.7 mm long. Paleae oblong-ob lanceolate, 1 mm long, 0.5 mm wide; apex pale-yellow, with margin irregularly dentate; midrib weak, glabrous. Chromosome number unknown.

Pine-oak and tropical deciduous forests in Nayarit, Jalisco, Colima, and Michoacán, Mexico (Fig. 18), 100-1740 m. Flowering dates, Aug-Feb.

Recent collections from Nayarit, Mexico, show much variation and intergradation in the leaf and inner involucre bract characters used by Blake (1926) to separate *M. tepicense* from *M. cornutum*. In my opinion they are conspecific.

REPRESENTATIVE SPECIMENS. **Mexico.** COLIMA: SW foothills of Nevado de Colima, 1-1.5 mi S of Hacienda San Antonio, 11 Aug 1957, *McVaugh* 16112 (MICH). JALISCO: ca 10 km NE of Puerto Vallarta near Milagro on rd to Mascota, 15 Nov 1963, *Feddema* 2577 (MICH); 10 mi S of Autlán, 19 Aug 1949, *R. & C. Wilbur* 2416 (MICH). MICHOACÁN: Coalcomán, Parotas, 28 Sep 1938, *Hinton et al.* 12276 (MICH, NY, UC, US). NAYARIT: 10 mi SE of Ahuacatlán on rd to Bar-

¹⁵Similar to the appendage in *M. longipilum*, except here in *M. tepicense* it is on the abaxial rather than the adaxial side of the achene apex.

ranca del Oro, 11-12 Aug 1959, *Feddema* 279 (MICH); 1 km N of El Cuatante, ca 40 km NNE of Puerto Vallarta, 18 Nov 1963, *Feddema* 2651 (MICH); 8 mi W of Tepic, 10 Sep 1960, *McVaugh* 18906 (MICH); 9 mi N of Compostela, 12 Nov 1959, *McVaugh & Koelz* 542 (MICH).

30. **Melampodium sinaloense** Stuessy, *Brittonia* 22:122. *f.* 10. 1970. TYPE: MEXICO: Sinaloa, Quebrado de Mansana, Sierra Surotato, 4000-4500 ft, 10-14 Sep 1941, *H. S. Gentry* 6507-A (Holotype, GH!; isotypes, ARIZ! DS! MICH! MO! NY!).

Annual herbs, 25-35 cm tall. Stems decumbent, 1-2 mm diam, sparsely tomentose to moderately hispidulous with hairs 0.1-0.3 mm long. Peduncles 1-2.9 cm long. Leaves with petioles 10-15 mm long, ovate, 3.5-5 cm long, 2-2.5 cm wide, at apex acute, at base attenuate, with both surfaces sparingly strigose with hairs 0.3-1.2 mm long; margin serrate. Heads 3-4 mm tall, 3-4 mm diam. Outer involucre cupulate, 5-10 mm diam; bracts 5, slightly connate at base, separate, narrowly elliptic to elliptic, 2.5-6 mm long, 1.2-1.5 mm wide, at apex obtuse, with abaxial surface with 2-5 hairs 0.3 mm long on midrib and major lateral veins; margin herbaceous. Fruits 1.8-2 mm long, with lateral surfaces ridged. Ray florets 6; ligules pale-yellow, elliptic, 1.5-2 mm long, 1-1.2 mm wide. Disc florets ca 14; corollas pale-yellow, 0.8 mm diam, with throat 0.7 mm and tube 0.6 mm long. Paleae elliptic, 1.3 mm long, 0.6 mm wide; apex pale-yellow, with margin irregularly and weakly dentate; midrib weak, glabrous. Chromosome number unknown.

Known only from the type collection from oak forests in Sinaloa, Mexico (Fig. 18), 1220-1370 m. Flowering date, Sep.

IV. **Melampodium** section **Bibractiaria** Stuessy, sect. nov.

Herbae annuae radicibus palmaribus; folia ovata vel obovata, sessilia vel subsessilia, marginibus integris; involucrem extimum cupulatum, bracteis 2, marginibus herbaceis vel leniter scariosis; ovaria flosculi disci ovoidea, minus quam 0.7 mm longa, rudimentales (Figs. 3 & 4); fructus apice fere laeves vel moderate sculpti et sine cucullis;

chromosomatum numerus basicus ignotus. Species 31 & 32. Typus: *Melampodium bibracteatum* S. Wats.

31. **Melampodium bibracteatum** S. Wats. Proc. Amer. Acad. Arts & Sci. 26:140. 1891. TYPE: MEXICO: México, Del Río [ca 13 mi N of Toluca], 30 Aug 1890, C. G. Pringle 3230 (Holotype, US!; isotypes, DS! F! G[2]! GH! MA! MO! MSC! NY [2]! P! UC! US! W!; photograph of holotype, TEX!; photograph of K isotype, US!).

Annual herbs, 2-32 cm tall. Stems ascending to decumbent, 1.8-3.5 mm diam, glabrous below to pubescent above with hairs 0.2 mm long. Peduncles 0-3.5 mm long (heads often sessile). Leaves sessile, with blades oblong to obovate or oblanceolate, 0.9-4 cm long, 0.3-1.8 cm wide, at apex obtuse-acute, at base obtuse-subauriculate to somewhat connate, with both surfaces with a conspicuous midrib (very large basally) extending 1/3-1/2 of blade, with upper surface glabrous, with lower surface subglabrous; margin entire to 6-lobed, moderately ciliate with hairs 0.1 mm long. Heads 3.5-4.5 mm tall, 3.5-4.8 mm diam. Outer involucre cupulate, 4-7 mm diam; bracts 2, separate, ovate, 3-4.2 mm long, 1.5-2.5 mm wide, at apex acute, with abaxial surface glabrous; margin herbaceous to weakly scarious, rarely with several hairs 0.2-0.5 mm long. Fruits 2-2.7 mm long, with lateral surfaces smooth with several conspicuous nerves. Ray florets (3-) 5-6; ligules yellow, elliptic-ovate, 1 mm long, 0.4 mm wide. Disc florets 4; corollas yellow, 0.8 mm diam, with throat 0.7 mm and tube 0.5 mm long. Paleae oblanceolate, 1.5 mm long, 0.6 mm wide; apex colorless, with margin irregularly laciniate; midrib very weak, glabrous. Chromosome number unknown.

Mainly in low, moist areas in pine-oak forests of central Mexico (Hidalgo, México and Puebla) but populations occur also in southwestern Durango and in Guatemala (Fig. 20), 2140-3360 m. Flowering dates, Aug-Oct.

REPRESENTATIVE SPECIMENS. **Guatemala.** HUEHUETENANGO: Sierra de los Cuchumatanes, 1.5 mi W of Llano de San Miguel on trail to Todos Santos, 2 Aug 1960, *Beaman* 3977 (GH, TEX, UC). **Mexico.**

DURANGO: 10 mi W of El Salto, 2 Oct 1962, *Cronquist* 9585 (NY); 3 mi SW of El Salto, 12 Aug 1961, *Waterfall* 16198 (SMU); 57 mi SW of Durango, 13 Aug 1957, *Waterfall & Wallis* 13702 (SMU, US). HIDALGO: near Buena Vista Station, 10 Aug 1904, *Pringle* 13068 (ARIZ, F, GH, SMU, US). MÉXICO: Tultenango Station, 14 Sep 1901, *Pringle* 9301 (F, GH, K, NY, US); ½ mi W of Station Del Río, 18 Aug 1966, *Stuessy* 675 (TEX); 7 mi W of Toluca, 19 Aug 1966, *Stuessy* 676 (TEX). PUEBLA: near Cerro El Pinar, 28 Aug 1945, *Alexander & Hernández* 2229 [XA 218] (NY); Laguna de San Baltasar, vicinity of Puebla, 20 Sep 1966, *Arsène* 294 (US).

32. *Melampodium repens* Sessé & Moc. Fl. Mex. ed. 2. 193. 1894. TYPE: MEXICO: Veracruz, "Habitat in medietate Vulcani altissimi de Orizava," Jun 1795-1804, *M. Sessé et al.* "3981" (Holotype, MA!; photograph of holotype, OS! TEX!).

Melampodium arvense Robins. Proc. Amer. Acad. Arts & Sci. 36:464. 1901. TYPE: MEXICO: Distrito Federal, Valley of Mexico, 7500 ft, 19 Oct 1896, *C. G. Pringle* 7327 (Holotype, GH!; isotypes, F! POM! US!; photograph of US isotype, TEX!).

Annual herbs, 2-30 cm tall. Stems prostrate (often forming a mat), 0.8-1.8 mm diam, puberulent with hairs 0.2 mm long. Peduncles 0-3 mm long (heads often sessile). Leaves sessile or with petioles 2 mm long, obovate, 0.5-2.5 cm long, 0.3-1.6 cm wide, at apex acute-obtuse, at base attenuate-obtuse to somewhat connate, with both surfaces with a conspicuous midrib (very large basally) extending less than 1/3 of blade, with upper surface glabrous, with lower surface subglabrous; margin obscurely crenate, sometimes moderately ciliate with hairs 0.1 mm long. Heads 2-3 mm tall, 3.5-4 mm diam. Outer involucre cupulate, 4-5 mm diam; bracts 2, separate, ovate, 3.5 mm long, 1.8-2.2 mm wide, at apex acute, abaxial surface glabrous; margin herbaceous. Fruits 2-2.5 mm long, with lateral surfaces smooth with several conspicuous nerves. Ray florets 2-3; ligules yellow, elliptic-oblong, 0.8-1.2 mm long, 0.3 mm wide. Disc florets 6; corollas yellow, 0.5 mm diam, with throat 0.4 mm and tube 1.0 mm long. Paleae oblanceolate, 1.2 mm long, 0.4 wide; apex colorless, with margin lacinate; midrib very weak, glabrous. Chromosome number unknown.

Pine-oak forests in the Mexican states of Distrito Federal, México, Michoacán, and Veracruz (Fig. 20), 1380-3150 m. Flowering dates, Aug-Sep.

The two species of section *Bibractiaria* are perhaps the most unusual taxa of the whole genus, particularly in their over-all diminutive appearance. Chromosome counts have not been obtained yet from these two species, although collections have been made and counts attempted. In view of the wide diversity of chromosome numbers already found in *Melampodium*, it will be interesting to learn if new numbers may be obtained from these two taxa.

REPRESENTATIVE SPECIMENS. Mexico. DISTRITO FEDERAL: Cima, 24 Aug 1910, *Orcutt* 3780 (F); Eslava, Valley of Mexico, 7 Sep 1901, *Pringle* 8610 (ARIZ, F, G, GH, K, MSC, NY, POM, SMU, TEX, UC, US). DURANGO [?]: "in mountains near Santa Angela," Sep 1855, *Schaffner* s.n. (GH). MÉXICO: Parque Nacional de Laguna Zempoala, 26 Jul 1947, *Barkley, Webster & Rowell* 7438 (TEX); Temascaltepec, Cucha, 4 Sep 1933, *Hinton* 4628 (GH, NY, US); Temascaltepec, Teju-pilco, 27 Sep 1933, *Hinton* 4826 (GH, K, NY, US); Toluca, 26 Sep 1892, *Pringle* 5257 (GH); Salto de Agua, Oct 1905, *Purpus* 1809 (F, UC); Popocatépetl, 22 Aug 1901, *Rose & Hay* 6244 (NY, US); Llano Grande, near Río Frio, 28 Jul 1944, *Sharp* 44116 (NY); 2 mi E of Cuajimalpa, 18 Aug 1966, *Stuessy* 670 (TEX). MICHOACÁN: SW side of Cerro San Andres, ca 12 km N of Ciudad Hidalgo, 6 Sep 1960, *Beaman* 4352 (GH). VERACRUZ: Loma Grande, 27 Aug 1938, *Balls & Gourlay* B5372 (K).

V. *Melampodium* section *Rhizomaria* Stuessy, sect. nov.

Plantae perennae rhizomatosae; folia anguste ovata vel oblonga, sessilia vel interdum sessilia, marginibus integris vel subintegris; involucrum extimum patens vel aliquantum cupulatum, bracteis 5, marginibus scariosis; ovaria flosculi disci ovoidea, minus quam 0.7 mm longa, rudimentales (Figs. 3 & 4); fructus apice fere laeves vel moderate sculpti et sine cucullis; chromosomatum numerus basicus, $x = 11$. Species 33 & 34. Typus: *Melampodium montanum* Benth.

33. *Melampodium montanum* Benth. Pl. Hartw. 64. 1840.

Suffrutescent perennials. Stems erect to ascending. Leaves usually sessile, ovate to elliptic, at apex obtuse

(rarely acute), at base obtuse to subauriculate. Outer involucre spreading or somewhat cupulate; bracts 5, connate 1/5 their length, imbricate, ovate, 4-5 mm long, 4-5 mm wide, at apex acute, with margin scarious. Fruits 1.6-1.8 mm long, with lateral surfaces smooth to nervose or marginally tuberculate. Ray florets 9-13; ligules yellow, narrowly elliptic-oblong. Disc florets 80-110; corollas yellow-green, with tube 0.8 mm long. Paleae oblanceolate, 2 mm long, 0.6 mm wide; apex yellow, with margin entire; midrib prominent, glabrous.

33a. **Melampodium montanum** Benth. var. **montanum**

Melampodium montanum Benth. Pl. Hartw. 64. 1840. TYPE: MEXICO: Oaxaca, "In summo jugo (Cumbre) inter Oaxaca et la Sierra," 1839, *C. T. Hartweg* 475 (Holotype, K!; photograph of holotype, OS! TEX! US!).

Melampodium liebmanii Sch. Bip. ex Klatt, *Leopoldina* 23:89. 1887. TYPE: MEXICO: Oaxaca, "Cumbre de Estepa et Yavesía," Jun 1842, *F. M. Liebmann* 232 (Lectotype, C; isotype, P!; photograph of lectotype, US!; photograph of C isotype, F! NY! US [2]!; photograph of P isotype, OS! TEX!; drawing and presumed fragment of lectotype, GH!).

Plants 6-28 cm tall. Stems 0.8-1.2 mm diam, copiously to sparsely villous with hairs 0.8-1.5 mm long. Peduncles 3-7.5 cm long. Leaves sessile or with petioles 1 mm long, 1.6-4 cm long, 0.8-1.7 cm wide, with both surfaces strigose with hairs 0.8 mm long; margin entire to obscurely denticulate. Heads 5-6 mm tall, 11-21 mm wide. Outer involucre 8-13 mm diam; bracts at apex purple-tinged, with abaxial surface villous with hairs 1 mm long. Ligules at apex and on veins on undersurface dark purple, 4-7.5 mm long, 1.5-2.5 mm wide. Disc florets 1 mm diam, with throat 1.4 mm long. Chromosome number, $n = ca\ 11$.

Pine-oak forests in north-central Oaxaca, Mexico (Fig. 26), 1740-3360 m. Flowering dates, Jul-Aug.

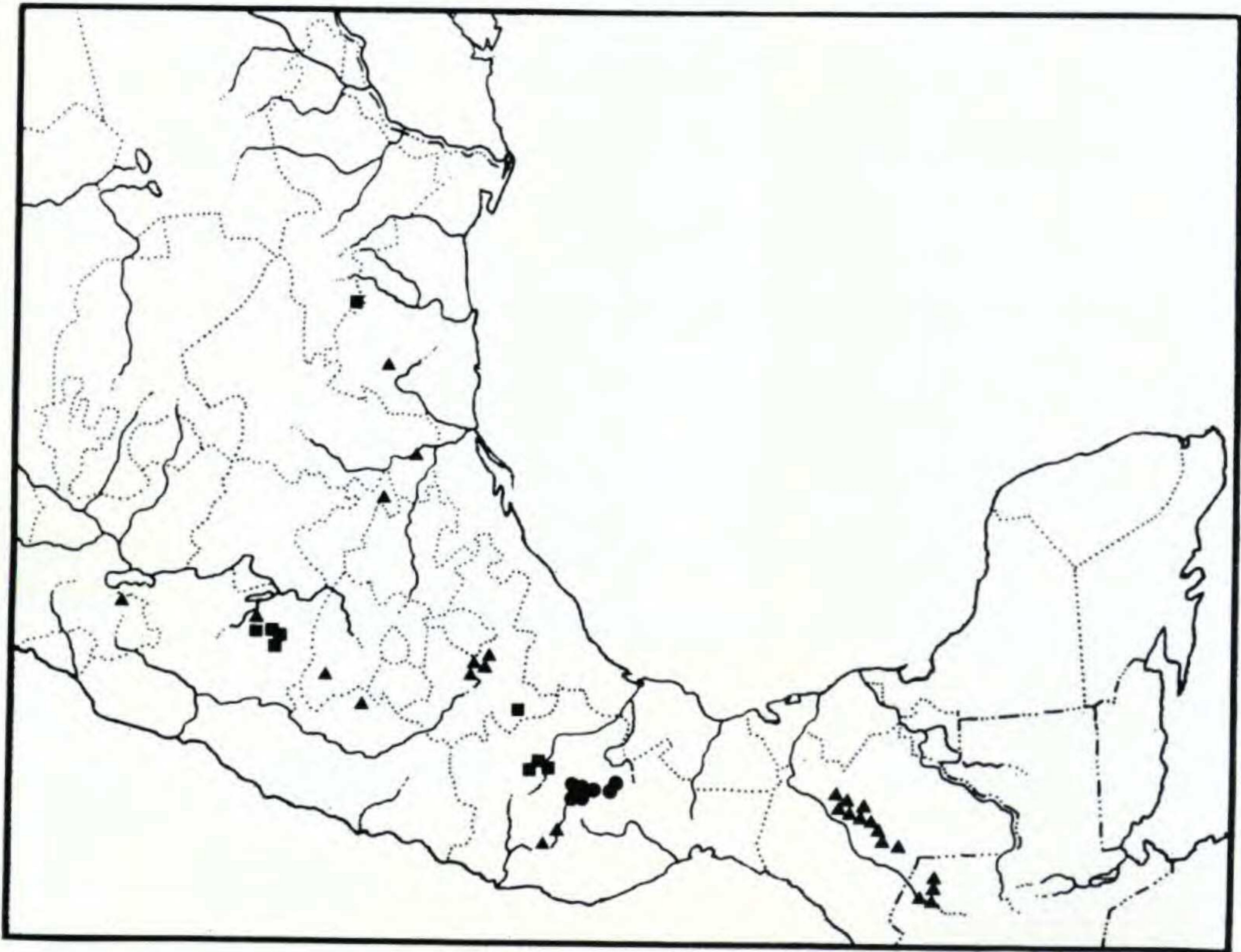


Fig. 26. Map of Mexico and adjoining Guatemala showing distribution of *Melampodium aureum* (squares), *M. montanum* var. *montanum* (dots), and *M. montanum* var. *viridulum* (triangles).

REPRESENTATIVE SPECIMENS. **Mexico.** OAXACA: Cerro San Felipe, 18 Aug 1921, *Conzatti* 4169 (US); Jul-Aug 1900, *Conzatti & González* 998 (GH); vicinity of Cerro Zempoaltepetl [Zempoaltepec], 10 Aug 1950, *Hallberg* 900 (US); ca 10 mi N of jct rtes 190 & 175, 26 Jul 1960, *King* 3492 (DS, NY, TEX, UC, US); NW side of summit of Mt Zempoaltepec, 9 Jul 1894, *Nelson* 655 (US); Sierra de San Felipe, 28 May 1894, *Pringle* 4666 (GH, US).

33b. ***Melampodium montanum* Benth. var. *viridulum* Stuessy, var. nov.**

Plantae 10-35 cm altae. Caules 0.8-1.4 mm diametro, villosi pilis 1-1.5 mm longis (raro glabri). Pedunculi 1-6.5 cm longi. Folia sessilia (vel petiolis 2-3 mm longis), laminae 1.6-3.3 longae, 0.7-1.4 cm latae, utrinque strigosae vel moderate villosae pilis 1-1.5 mm longis (subtus raro glabrae); margines integri. Capitula 4.5-6 mm alta, 12-17 mm diametro. Involucrum extimum 8-14 mm diametro; bracteae apice interdum purpurascens, extus villosae pilis

1 mm longis (interdum subglabrae). Ligulae subtus apice venaque viridulae, 4-5 mm longae, 1.2-1.9 mm latae. Flosculi disci 0.8 mm diametro, faucibus 1.2 mm longis. Chromosomatum numerus, $n = 11$.

TYPUS: MEXICO: Chiapas, ca 5 mi E of San Cristóbal de Las Casas on rte 190, 11 Jun 1960, *R. M. King* 2801 (Holotype, US!; isotypes, DS! NY! TEX! UC!).

Scattered in pine-oak forests in several Mexican states in the Sierra Madres Oriental, Occidental and Sur, and including Chiapas and northwestern Guatemala (Fig. 26), 610-2740 m. Flowering dates, Jun-Oct.

REPRESENTATIVE SPECIMENS. **Guatemala.** HUEHUETENANGO: Sierra de los Cuchumatanes, between kms 324 & 325 on rte 9N (between Chemal & San Juan Ixcoy), 4 Aug 1959, *Beaman* 3043 (GH, NY, UC); San Pedro Coloma, 20 Aug 1934, *Skutch* 1036 (F, GH, US); SW slopes of Sierra de los Cuchumatanes, between Chiantla & Patio de Bolas, 6 Jul 1942, *Steyermark* 48234 (F); along Río Selegua, opposite San Sebastián H., 13 Aug 1942, *Steyermark* 50490 (F, GH). **Mexico.** CHIAPAS: Jitotol, 3 mi S of Jitotol, 12 Feb 1965, *Breedlove* 8906 (DS); Tenejapa, Tuk, Matsab, 30 Sep 1965, *Breedlove* 12522 (DS); Comitán, 30 Apr 1904, *Goldman* 914 (US); ca 17 mi W of San Cristóbal de Las Casas, 9 Jun 1960, *King* 2796 (DS, NY, TEX, UC, US); ca 1 mi E of Teopisca, 12 Jun 1960, *King* 2843 (TEX); San Cristóbal de Las Casas, Cerro San Cristóbal, 11 Jun 1966, *Laughlin* 1050 (DS); Amatenango del Valle, 12 Jun 1945, *Matuda* 6002 (F); 34 mi S of Ishuatán on gravel rd to Tuxtla Gutiérrez, 24 Jul 1966, *Stuessy* 559 (TEX); 20 mi S of San Cristóbal, 25 Jul 1966, *Stuessy* 566 (TEX); 8 mi S of San Cristóbal, 25 Jul 1966, *Stuessy* 567 (TEX); 2 mi SE of Teopisca, 25 Jul 1966, *Stuessy* 568 (TEX); 9 mi SE of Teopisca, 25 Jul 1966, *Stuessy* 570 (TEX). GUERRERO: Taxco, 23 Jul 1936, *Abbott* 162 (GH). JALISCO: Sierra del Tigre, 3 mi S of Mazamitla, 18 Sep 1952, *McVaugh* 13033 (SMU, US). MÉXICO: Temascaltepec, Bejucos, 7 Oct 1932, *Hinton* 2017 (ARIZ, F, MA, NY [2], US). MICHOACÁN: Morelia, Cerro Azul, 1910, *Arsène* 6575 (US). OAXACA: 15 km S of Sola de Vega, on rd to Puerto Escondido, 30 Sep 1965, *Rzedowski* 21322 (TEX). PUEBLA: vicinity of Puebla, woody hill farther than Cerro Tepoxuchitl, 16 Sep 1907, *Arsène* 1896 (GH, NY, US); hills near Amozoc, 10 Sep 1901, *Pringle* 9361 (F, GH, US). QUERÉTARO: 8 km W of El Lobo, municipio de Landa, 31 Aug 1957, *Rzedowski* 9320 (ENCB). SAN LUIS POTOSÍ: "barranca of Las Canoas," 18 Aug 1891, *Pringle* 3818 (DS, F, GH [2], NY [2], UC [2], US). TAMAULIPAS: Gómez Farías Region, between Rancho del Cielo & Charco de los Perros, spring 1965, *Webster* 140 (TEX).

34. **Melampodium aureum** Brandg. Univ. Calif. Pub. Bot. 4:94. 1910. TYPE: MEXICO: Puebla, Cerro de Gavilán, 8000-9000 ft, Aug 1909, C. A. Purpus 3822 (Holotype, UC!; isotypes, F! G! GH! MO! NY! US!; photograph of US isotype, TEX!).

Suffrutescent perennials, 10-35 cm tall. Stems erect to ascending (occasionally decumbent), 0.8-2 mm diam, moderately villous with hairs 0.5-1 mm long. Peduncles 4.5-11.5 cm long. Leaves usually sessile or with petioles 2-3 mm long, ovate to weakly spatulate, 2.7-6 cm long, 1-2.7 cm wide, at apex obtuse to acute, at base obtuse to subauriculate, with both surfaces strigose with hairs 0.5-0.8 mm long; margin entire to serrulate, ciliate with hairs 0.3 mm long. Heads 6-7 mm tall, 19-38 mm diam. Outer involucre spreading or somewhat cupulate, 10-14 mm diam; bracts 5, connate 1/5 their length, imbricate, ovate, 4-6 mm long, 3.5-6 mm wide, at apex acute and sometimes purple-tinged, with abaxial surface villous with hairs 0.5 mm long (sometimes mostly glabrous); margin scarious. Fruits 2-2.3 mm long, with lateral surfaces smooth to rugose-aculeate. Ray florets 11-14; ligules yellow-orange to yellow, narrowly elliptic-oblong to oblanceolate, 5-13 mm long, 2-3 mm wide. Disc florets 80-110; corollas yellow, 1 mm diam, with throat 1.8 mm and tube 0.7 mm long. Paleae oblanceolate, 3.2 mm long, 0.6 mm wide; apex yellow, with margin entire; midrib prominent, glabrous. Chromosome number, $n = 33$.

Scattered in pine-oak forests in Nuevo León, Michoacán, Oaxaca, and Puebla, Mexico (Fig. 26), 1800-2500 m. Flowering dates, Jul-Sep.

The morphology of the hexaploid *M. aureum* suggests that it may have been derived from the diploid *M. montanum* by autopolyploidy, perhaps through the union of unreduced gametes from diploid and tetraploid plants. The two taxa are so similar, in fact, that experimental studies may indicate that *M. aureum* should be treated as simply a polyploid race of *M. montanum*. The extant chromosomal voucher specimens, however, do show a considerable amount

of morphological divergence albeit of a quantitative nature. In view of these morphological differences and in the absence of intensive field and laboratory studies, I prefer to maintain the two taxa as distinct species at the present time.

REPRESENTATIVE SPECIMENS. **Mexico.** MICHOACÁN: vicinity of Morelia, Cerro San Miguel, 15 Sep 1910, *Arsène* 5219 (GH, NY, US); ca 20 mi W of Ciudad Hidalgo, 4 Aug 1960, *King* 3617 (DS, NY, TEX, UC, US); 23 mi NW of Ciudad Hidalgo, 19 Aug 1966, *Stuessy* 682 (TEX); 21 mi NW of Ciudad Hidalgo, 19 Aug 1966, *Stuessy* 684 (TEX). NUEVO LEÓN: Dulces Nombres, 20 Jul 1948, *Meyer & Rogers* 2828 (US), 10 Aug 1948, 2911 (US). OAXACA: Nochistlán, Cuesta Blanca, rd to Montelobos, 22 Jun 1907, *Conzatti* 1865 (F); ca 8 mi SE of Nochistlán, 27 Jul 1960, *King* 3529 (DS, NY, TEX, UC, US); 7 mi SE of Nochistlán, 15 Aug 1966, *Stuessy* 663 (TEX). PUEBLA: Cerro del Oro, Aug 1909, *Purpus* 3822a (F, GH, NY, UC, US).

VI. *Melampodium* section *Alcina* (Cav.) DC.

Melampodium L. sect. *Alcina* (Cav.) DC. Prodr. 5:520. 1836. *Alcina* Cav. Ic. 1:10. t. 15. 1791. Type species: *Melampodium perfoliatum* (Cav.) H.B.K.

Tap-rooted annuals; leaves ovate or oblong, sessile or petiolate, with margins entire or weakly serrate; outer involucre spreading, with bracts 3-5, at margins herbaceous; ovaries of the disc florets ovoid, less than 0.7 mm long, rudimentary (Figs. 3 & 4); fruits at apex nearly smooth or moderately sculptured and without hoods; chromosome base number, $x = 11$. Species 35-37.

35. *Melampodium perfoliatum* (Cav.) H.B.K. Nov. Gen. Sp. 4:274. 1820.

Alcina perfoliata Cav. Cav. Ic. 1:11. t. 15. 1791. TYPE: "IMPERIO MEXICANO": cultivated in Bot. Gard. Madrid, flowering 29 Nov (Lectotype chosen, MA!; isotypes, MA [2]!; photograph of lectotype, OS! TEX!).

Wedelia perfoliata (Cav.) Willd. Sp. Plant. 3(3):2335. 1803.

Polymnia perfoliata (Cav.) Poiret, Encycl. Méthod. Botan. 5:506. 1804.

Camutia perfoliata Bonato ex Steud. Nom. Bot. 146. 1821.
pro syn.

Melampodium connatum Sessé & Moc. ex DC. Prodr.
5:521. 1836. *pro syn.*

Polymnia revoluta Autor. ex Steud. Nom. Bot. ed. 2. 2:
377. 1841. *pro syn.*

Annual herbs, 20-150 cm tall. Stems erect, 1-11 mm diam, glabrous below to very minutely puberulent above. Peduncles 0.6-11 cm long. Leaves sessile, rhombic-deltoid (rarely ovate-obovate) and tapering to an auriculate-connate base (sometimes obtuse on upper leaves), 2-21 cm long, 0.9-15 cm wide, at apex acute, with both surfaces strigose with hairs 0.2-0.3 mm long; margin obscurely to strongly irregularly serrate. Heads 5-7 mm tall, 8-11 mm diam. Outer involucre spreading, 15-32 mm diam; bracts 5, slightly imbricate and connate at base, oblong-elliptic, 6-20 mm long, 4-11 mm wide, at apex obtuse, with abaxial surface occasionally strigose with hairs 0.2-0.5 mm long; margin herbaceous. Fruits 4-7 mm long, with lateral surfaces smooth to moderately striate or nervose. Ray florets 8-13; ligules yellow-orange, oblong-elliptic, 2.5-4 mm long, 0.9-2.3 mm wide. Disc florets 30-45; corollas yellow, 1.5 mm diam, with throat 1 mm and tube 0.8 mm long. Paleae oblong-elliptic, 2.1 mm long, 0.7 mm wide; apex light yellow, with margin dentate-laciniate; midrib distinct, glabrous. Chromosome numbers, $n = 11$ & 12.

Tropical deciduous and pine-oak forests in Mexico, Guatemala, and Costa Rica, introduced to Cuba and Los Angeles, California (Fig. 27), 610-2440 m. Flowering dates, Jan-Dec.

M. perfoliatum is the second most widely spread species in the genus (after *M. divaricatum*), but apparently it has been introduced only at one point in the United States (near Los Angeles). Because the city of Los Angeles and surrounding suburbs have grown tremendously in the last

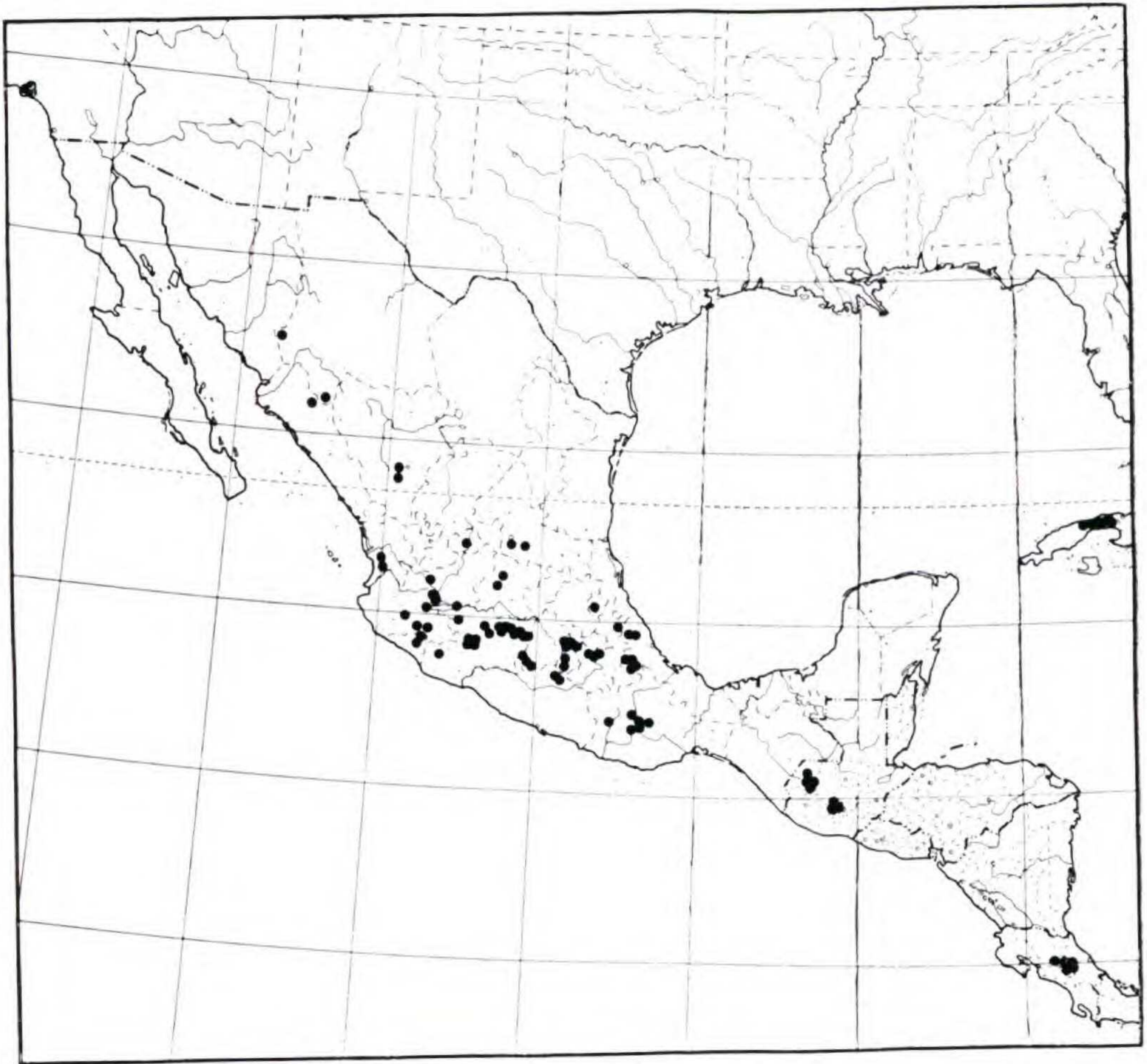


Fig. 27. Map of Mexico, Central America and neighboring countries showing distribution of *Melampodium perfoliatum*.

60 years, it is likely that *M. perfoliatum*, however weedy and aggressive, has not managed to survive. Specimens examined from Los Angeles Co., California, support this contention, as there are no records later than 1902.

At maturity *M. perfoliatum* is very easy to recognize because the large fruits remain temporarily in a conspicuous ring within the spreading foliaceous outer phyllaries. In the field the bases of the lower leaves are markedly perfoliate and also help distinguish the species. On herbarium specimens, however, this latter characteristic is less helpful because the bases of the upper leaves are sometimes obtuse, and such leaves, due to their more convenient size, most frequently are selected and pressed by collectors.

An interesting nomenclatural problem is associated with the earliest date of publication for the combination *Melampodium perfoliatum*. It has generally been attributed to H.B.K. in 1820. An anonymous author (perhaps M. A. Valdes, *fide* Langman, 1964) in the *Gazeta de México* of 1792-93 (vol. 5, p. 243) reported the events taking place at a public botanical examination in La Real y Pontífica Universidad in Mexico City on December 7, 1792. At this gathering a student, Sebastián Gómez Moron, read a paper in which he “. . . determinó y describió con la mayor propiedad el Melampodio reunido, o *Melampodium perfoliatum*. . . .” A footnote elaborates in some detail the circumstances surrounding this new combination which precedes that of H.B.K. by at least 27 years. According to the anonymous author, it was the “opinión” of the “Expedición” (i.e., Sessé, Castillo, and Mociño) traveling through Mexico, that *Alcina perfoliata* of Cavanilles should not be generically separated from the well-known *Melampodium*. The student, Gómez Moron, apparently looked into the matter more closely and agreed with this contention. The author adds another sentence in the footnote, however, that changes the nomenclatural complexion of the situation: “Los Botánicos que tuvieren ocasion de cotejar la Planta, ó la exacta descripción de este autor [Cavanilles] con qualquiera de los Melampodios conocidos, pesarán los fundamentos que median entre una y otra parte, y fixarán el nombre con que debe conocerse en lo sucesivo esta nueva especie.” The author states that botanists who might compare the species with the existing taxa of *Melampodium* will have to weigh the facts and decide what the correct name *should be*. I interpret this hesitation to mean that the author did not accept the new combination at this time, which therefore precludes its validation (Article 34, Provisions 1 and 2, Intern. Code Bot. Nomen.; Lanjouw et al., 1966).

REPRESENTATIVE SPECIMENS. **Costa Rica.** ALAJUELA: between San Josecito & La Garita, 18 Aug 1963, *Jiménez* 1074 (F). CARTAGO: vicinity of Turrialba, 5 Feb 1965, *Godfrey* 66184 (FSU); Turrialba,

Instituto Interamericano de Agrícolas, 20 Aug 1962, *King* 5350 (TEX, UC, US); 4 km E of Cartago, 28 Aug 1962, *King* 5407 (TEX, UC, US). SAN JOSÉ: Río Torres, San José, 31 Jan 1965, *Godfrey* 66064 (FSU). **Cuba.** LA HABANA: Santiago de las Vegas, 30 Jun 1904, *Baker & Wilson* 516 (F, NY, UC, US); Laguna de Ariguanabo at Cayo La Rosa, 17 Jul 1923, *Ekman* 16932 (NY); Santiago de las Vegas, 10 Oct 1904, *Hermann* 148 (F, NY, US); Laguna de Castellano, 27 Dec 1910, *Wilson* 9553 (NY [2]). PINAR DEL RÍO: near Potrerito, Sumidero, 19 May 1951, *Alain* 1819 (NY). **Guatemala.** GUATEMALA: city limits of Guatemala, 9 Jul 1960, *King* 3248 (DS, NY, TEX, UC, US); Guatemala City, 1 Aug 1966, *Stuessy* 603 (TEX). HUEHUETENANGO: ca 1 mi S of Huehuetenango, 18 Jul 1960, *King* 3410 (DS, NY, TEX, UC, US); 2 mi S of Huehuetenango, 26 Jul 1966, *Stuessy* 580 (TEX). QUICHÉ: 1942, *Aguilar* 1942 (F). **Mexico.** AGUASCALIENTES: below Presa Calles, 31 Aug 1939, *Shreve* 9278 (ARIZ, GH). CHIHUAHUA: Arroyo Hondo, Sierra Charuco, 11 Sep 1935, *Gentry* 1752 (ARIZ, F, GH, NY, UC, US); Municipio de Guadalupe & Calvo, Nabogame, 11 Oct 1959, *Gentry, Correll & Arguelles* 17970 (US). COLIMA: Colima, 9 Jan-6 Feb 1891, *Palmer* 1163 (GH, NY, US); Alzada, 25 Aug 1966, *Stuessy* 729 (TEX). DISTRITO FEDERAL: Mixcoac, Olivar, 7 Sep 1913, *Arsène* s.n. (US); San Andrés, Aug 1930, *Lyonnet* 569 (US); Pyramid of Cuicuilco, Tlalpán, 15 Aug 1935, *MacDaniels* 41 (F); near Tlalpán, 1 Sep 1936, *MacDaniels* 723 (F); San Ángel, 12 Aug 1910, *Orcutt* 3548 (F). DURANGO: vicinity of Durango, Jun 1896, *Palmer* 286 (F, GH, NY, UC, US); ca 30 mi N of Durango, 12 Nov 1959, *Gentry & Arguelles* 18152 (US). GUANAJUATO: Guanajuato, *Dugès* 461 (GH), 462 (GH); Obregón, 13 Oct 1895, *Volkens* 1134 (GH, NY). GUERRERO: Taxco, 28 Sep 1937, *Abbott* 445 (GH), 5 Sep 1959, *Degener* 26220 (NY); Mina, Zihuaqueo-Filo Mayor, 20 Aug 1936, *Hinton et al.* 9293 (GH, US). JALISCO: La Barranca, 24 Nov 1930, *Jones* 27773 (DS [2], F, NY, POM, UC); NE slopes of Nevado de Colima, below Canoa de Leoncito, 17 Oct 1952, *McVaugh* 13576 (SMU, US); near Santa Mónica, 12-13 Nov 1952, *McVaugh* 14107 (SMU, US); near Guadalajara, 29 Oct 1888, *Pringle* 1767 (F, GH, NY [2], UC, US); 2 mi NW of La Barca, 23 Aug 1966, *Stuessy* 705 (TEX). MEXICO: Valley of México, Tizapán, 12 Feb 1865-66, *Bourgeau* 841 (GH); Temascaltepec, Temascaltepec, 2 Sep 1932, *Hinton* 1521 (NY); Temascaltepec, Chorrera, 25 Sep 1932, *Hinton* 1838 (GH, NY, US); Temascaltepec, Ixtapán, 2 Nov 1932, *Hinton* 2480 (NY, UC, US); ½ mi N of Tepetlixpa, 16 Aug 1966, *Stuessy* 668 (TEX). MICHOACÁN: 13 mi S of Uruapán, 28 Oct 1962, *Cronquist* 9745 (NY, SMU, TEX, US); ca 11 mi W of the Michoacán-Mexico state border on rte 15, 3 Aug 1960, *King* 3600 (DS, NY, SMU, TEX, UC, US); E of San Juan Nuevo (ca 8 km S of Uruapán), 11-15 Oct 1961, *King & Soderstrom* 4707 (NY, SMU, TEX, UC, US); 2 mi W of Ciudad Hidalgo, 21 Aug 1961, *Powell & Edmondson*

816 (DS, F, TEX); 0.8 mi NW of Zitacuaro, 1 Sep 1965, *Stuessy* 379 (TEX). MORELOS: vicinity of Cuernavaca, 28 Jan 1932, *Asplund* 517 (NY), 31 Aug 1910, *Orcutt* 3892 (F, US). NAYARIT: vicinity of Jalisco, 10 Nov 1925, *Ferris* 5890 (DS, GH, US); Tepic, 14 Feb 1927, *Jones* 23398 (POM), 10 Feb 1927, *Jones* 23402 (POM). PUEBLA: vicinity of Puebla, Manzanilla, Nov 1908, *Arsène* 3523 (US); ca 5 mi W of Puebla, 29 Jul 1960, *King* 3560 (NY, TEX, UC, US); vicinity of Puebla, Hacienda Batan, 20 Dec 1911, *Nicolas* 6150 (GH, US); Teteles, 9 Jul 1966, *Stuessy* 497 (TEX); 3 mi W of Puebla, 14 Jul 1966, *Stuessy* 503 (TEX). OAXACA: Cerro San Felipe, 20 Sep 1908, *Conzatti* 2291 (F); vicinity of Totontepec, 15-20 Jul 1894, *Nelson* 715 (US); Sierra de San Felipe, Oct 1894, *Smith* 351 (F); N city limits of Zimatlán, 14 Aug 1966, *Stuessy* 654 (TEX). SAN LUIS POTOSÍ: 32 mi E of San Luis Potosí, 19 Sep 1960, *Crutchfield & Johnston* 5643a (TEX); near San Luis Potosí, Aug 1876, *Schaffner* 270 in part (GH, NY). SINALOA: Ocurahui, Sierra Surotato, 1-10 Sep 1941, *Gentry* 6350 (ARIZ, DS, GH, NY). VERACRUZ: Zacualpán, Dec 1907, *Purpus* 2849 (F, GH, NY, UC, US); Mt Orizaba, 22 Aug 1891, *Seaton* 54 (F, GH, NY, US); 8 mi NW of Jalapa, 9 Jul 1966, *Stuessy* 494 (TEX); 34 mi NW of Tehuacán, 14 Jul 1966, *Stuessy* 505 (TEX); ½ mi W of San Juan, near Pico de Orizaba, 15 Jul 1966, *Stuessy* 511 (TEX). UNITED STATES. California: LOS ANGELES CO.: Cienega, Aug 1902, *Braunton* 625 (DS, UC [2], US); Los Angeles, Aug 1902 [03?], *Grant* 763 (ARIZ, F, UC), Sep 1879, *James* s.n. (NY, US); between Los Angeles & Compton, Nov 1895, *McClatchie* s.n. (DS, NY, POM); Los Angeles, Oct 1882, *S. & W. Parish* 1171 (DS, F, GH, NY, US [2]).

36. *Melampodium glabrum* S. Wats. Proc. Amer. Acad. Arts & Sci. 26:139. 1891. TYPE: MEXICO: Guanajuato, valley near Irapuato, 20 Sep 1889, *C. G. Pringle* 2821 (Holotype, GH!).

Annual herbs, 25-60 cm tall. Stems erect, 1-10 mm diam, somewhat soft and watery when fresh, glabrous near base and covered with bladderly hairs toward apex. Peduncles 2.5-5.5 cm long. Leaves sessile, oblong-ob lanceolate, 2.5-6 cm long, 0.7-2.1 cm wide, at apex obtuse, at base subauriculate, with both surfaces waxy and glabrous; margin sinuate-dentate. Heads 4.3-5 mm tall, 7-11 mm wide. Outer involucre spreading, 8-10(14) mm diam; bracts 5, fleshy, slightly connate at base, imbricate, ovate-orbiculate, 4.2-6 mm long, 3.8-4.5 mm wide, at apex obtuse with abaxial surface glabrous; margin herbaceous. Fruits 2.5-2.9 mm long,

with lateral surfaces smooth to moderately striate or nervose. Ray florets 6-8; ligules yellow, oblong-ovate, 1.3-3.4 mm long, 0.7-1.4 mm wide. Disc florets 30-50; corollas yellow, 1 mm diam, with throat 0.9 mm and tube 0.8 mm long. Paleae oblanceolate-elliptic, 1.6 mm long, 0.5 mm wide; apex yellow, with margin entire; midrib prominent, glabrous. Chromosome number, $n = 11$.

Very moist areas in pine-oak forests or high altitude grasslands in the Mexican states of Guanajuato, Jalisco, and Michoacán (Fig. 13), ca 1890 m. Flowering dates, Aug-Sep.

This species is an attractive, fleshy, little herb found often in moist depressions on roadsides. The large foliaceous outer involucre bracts and conspicuous blackish fruits as well as the $n = 11$ chromosome number indicate that *M. glabrum* is allied closely to *M. perfoliatum*.

REPRESENTATIVE SPECIMENS. **Mexico.** GUANAJUATO: near San Miguel Allende, Aug 1947, *Kenoyer* 2421 (GH). JALISCO: valley of the Lerma near La Barca, 16 Sep 1891, *Pringle* 3863 (DS, G, GH [2], MA, MSC, NY [2], P, UC [2], US, W); 3 mi N of La Barca, 24 Aug 1966, *Stuessy* 708, 709 (TEX). MICHOACÁN: vicinity of Morelia, 13 Sep 1910, *Arsène* s.n. (US); 9 mi S of jet rte 15 on rd to Cotija, 24 Aug 1966, *Stuessy* 714 (TEX).

37. ***Melampodium nutans*** *Stuessy*, *Brittonia* 22:122. *f.* 9. 1970. TYPE: MEXICO: Colima, 12 mi S of Colima on rte 110, 25 Aug 1966, *T. F. Stuessy* 721 (Holotype, US!; isotypes, DS! F! GH! MICH! NY! TEX! UC!).

Annual herbs, 16-40 cm tall. Stems erect, 1.2-2 mm diam, hispidulous-strigillose with hairs 0.2-0.5 mm long. Peduncles 5.5-6.5 cm long. Leaves ovate to rhombic, with tapering petioles 1-3 cm long, blades 4-5 cm long, 2-4 cm wide, at apex acuminate, at base attenuate, with both surfaces strigose with hairs 0.5 mm long; margin subentire to serrate. Heads 4-6 mm tall, 7-8(10) mm diam. Outer involucre spreading, 8-14 mm diam; bracts 3 (rarely 4), slightly connate at base, separate, ovate to narrowly ovate, 4-7 mm long, 2.5-4 mm wide, at apex acute, with abaxial

surface strigose with hairs 0.3-0.5 mm long; margin herbaceous. Fruits 1.8-2.1 mm long, with lateral surfaces ribbed and reticulated; hood at apex muticous to cirrhous¹⁶, with tapering appendage up to 6 mm long. Ray florets 5-7; ligules yellow-orange, orbiculate, margins imbricate, 2-3 mm long, 2-4 mm wide. Disc florets 40-80; corollas yellow-orange, 1.7 mm diam, with throat 0.7 mm and tube 1 mm long. Paleae narrowly obovate, 2 mm long, 1 mm wide; apex yellow, with margin laciniate; midrib distinct, puberulent with hairs 0.1 mm long. Chromosome number, $n = 11$.

Tropical deciduous forests of Colima, Jalisco, Michoacán and Oaxaca, Mexico (Fig. 13), 50-500 m. Flowering dates, Aug-Nov.

The hoods on fruits of *M. nutans* are shorter and thicker than are the hoods of species of section *Melampodium*. Such a difference is not unexpected, however, because *M. nutans* differs in many other respects from the taxa in that section. Due to the spreading outer involucre bracts, rudimentary disc ovaries, herbaceous habit, and chromosome number of $n = 11$ of this species, it clearly belongs in section *Alcina* near *M. perfoliatum* and *M. glabrum*.

REPRESENTATIVE SPECIMENS. **Mexico.** COLIMA: ca 11 mi SSW of Cd Colima, 21 Sep 1958, *McVaugh* 18070 (MICH), 25 Nov 1959, *McVaugh & Koelz* 1054 (MICH); 12 mi S of Cd Colima, 25 Aug 1966, *Stuessy* 720 (TEX). JALISCO: between Sierra de los Corales & Tepalcatepec, Michoacán, 26 Oct 1963, *Feddema* 2238 (MICH); Tecalitlán, 26 Oct 1963, *Rzedowski* 17514 (MICH, OS). MICHOCÁN: ca 5 km NW of Águila, 23 Nov 1963, *Feddema* 2700 (MICH); 15 mi SSW of Apatzingán, 2 Aug 1940, *Leavenworth* 431 (F, GH, NY), 432 (F); 8 km NW of Águila, 23 Nov 1963, *Rzedowski* 17921 (MICH, OS). OAXACA: 3 km SW of Puerto Ángel, 24 Sep 1965, *Rzedowski* 21155 (OS).

¹⁶Isotype material in my preserved personal collection has fruits with both muticous hoods and hoods with long cirrhous appendages in the same head (cf. Fig. 9E in Stuessy, 1970b).

DOUBTFUL SPECIES

Melampodium angulatum Sessé & Moc. Pl. Nov. Hispan. 149. 1890. TYPE: MEXICO: Guerrero, Ayahualtempa, Aug 1789, *M. Sessé et al.* s.n. (Holotype, MA?). From the description and locality data this taxon seems most similar to *M. perfoliatum*, although the leaf undersurface in the latter species is never "tomentose."

Melampodium dichothomum Sessé & Moc. Pl. Nov. Hispan. 149. 1890. TYPE: MEXICO: Guerrero, Mazatlán [ca 15 km S of Chilpancingo; Sprague (1926), and Rickett (1947)], Jun 1789, *M. Sessé et al.* "3977." MA has a mixed sheet with both *M. montanum* and *M. divaricatum* and another sheet with *M. divaricatum*. A sheet at F has a fragment of only *M. divaricatum*. The description more closely resembles *M. montanum*, but both *M. divaricatum* and *M. montanum* are found in Guerrero, and neither seems explicitly excluded by the description.

Melampodium diversifolium Sessé & Moc. Fl. Mex. ed. 2. 197. 1894. TYPE: locality unknown, 1787-1804, *M. Sessé et al.* s.n. (Holotype, MA?). The description seems to refer to *M. linearilobum* or *M. longipes*, but not mentioned are several diagnostic characters such as the leaf undersurface and margins of the outer involucral bracts.

Melampodium pinnatum Sessé & Moc. Pl. Nov. Hispan. 149. 1890. TYPE: MEXICO: Michoacán, Apatzingán, Oct 1790-91, *M. Sessé, J. M. Mociño & J. Castillo* s.n. (Holotype, MA?). The description is too general to allow any specific placement.

Melampodium rhombifolium Sessé & Moc. Pl. Nov. Hispan. 149. 1890. TYPE: MEXICO: México, San Agustín, Sep 1787-1804, *M. Sessé et al.* s.n. (Holotype, MA?). The character "Receptaculum nudum," if correct, would exclude this taxon from *Melampodium*.

Melampodium rhombifolium Sessé & Moc. Fl. Mexic. ed. 2. 195 [second on page]. 1894. *nom. illegit. non* Sessé & Moc. 1890. *nec* Sessé & Moc. [first on page]. 1894. TYPE:

MEXICO: "Hortis Sancti Augustini, prope Mexicum," Aug-Sep 1787-1804, *M. Sessé et al.* s.n. (Holotype, MA?). Specific affinity cannot be determined from the description.

EXCLUDED NAMES

Melampodium L. sect. *Acanthospermum* (Schrank) Baillon, Hist. Plant. 8:231. 1882. = *Acanthospermum* Schrank, Pl. Rar. Hort. Acad. Monac. 53. 1820.

Melampodium achillaeoides (Less.) Hemsley, Biol. Centr. Am. Bot. 2:145. 1881. = *Villanova achillaeoides* (Less.) Less. Syn. Gen. Comp. 256. 1832. TYPE: MEXICO: "los Llanos de Perote," Sep 1828, *C. J. W. Schiede* 354 (Holotype, HAL!; photograph of holotype, OS! TEX!).

Melampodium anomalum M. E. Jones, Contr. West. Bot. 18:72. 1933. TYPE: MEXICO: Jalisco, near Guadalajara, La Barranca, 17 Nov 1930, *M. E. Jones* 27727 (Lectotype, POM; isotype, MO! NY!; photograph and fragment of lectotype, US!). = *Tragoceras schiedeanaum* Less. Linnaea 9:269. 1834. *fide* Blake (1945) and Torres (1963).

Melampodium australe Loefl. Iter Hisp. 268. 1758. TYPE: VENEZUELA: vicinity of Barcelona, 15 Feb 1755, *P. Loeffling* "151" (Holotype, LINN). = *Acanthospermum australe* (Loefl.) Kuntze, Rev. Gen. Pl. 1:303. t. 23, h-m. 1891.

Melampodium baranguillae Spreng. Syst. 3:619. 1826. TYPE: COLOMBIA: "Ad fl. Magdalenae," date unknown, *C. G. Bertero* s.n. (Holotype, P-CO). Blake (1930) saw the type of *M. baranguillae* in the Schultz-Bipontinus Herbarium and found "it to be identical with *Sclerocarpus columbianus* Rusby & Blake."

Melampodium bonairense Boldingh, Fl. Neder. West-Ind. Eil. 393. 1913. Fl. Dutch West Ind. Is. 2:107. t. 9. 1914. TYPE: DUTCH WEST INDIAN ISLANDS: Island Curaçao, Malpais, 28-30 Oct 1909, *I. Boldingh* M.14 (Holotype, U; paratype [*Boldingh* 7401], P!; fragment of P paratype, US!; photograph of K paratype [*Boldingh* 7401], US!). = *Baltimora* sp.

Melampodium camphoratum (L.f.) Baker in Martius, Fl. Bras. 6(3):161. 1884. = *Unxia camphorata* L.f. Suppl. 368. 1781. TYPE: SURINAM: "locis arenosis," date unknown, C. G. Dalberg s.n. (HOLOTYPE, LINN; photograph of holotype, OS!).

Melampodium digynum (Steetz in Seem.) Jackson, Index Kew. 2:188. 1895. *Unxia digyna* Steetz in Seem. Bot. Voy. Herald. t. 30. 1853. text 154. 1854. TYPE: PANAMA: "about Panama [City]," Nov 1846, B. C. Seemann 46 (HOLOTYPE, BM; photograph and fragment of K isotype, US!; photograph of K isotype, F! US [2]!). = *Unxia camphorata* L.f. Suppl. 368. 1781.

Melampodium? *dombeyanum* DC. Prodr. 5:520. 1836. TYPE: PERU: locality and date unknown, J. Dombey s.n. (Holotype, G-DC; isotype, P!; photograph of holotype, IDC 800. 923: III. 6!; photograph of P isotype, OS! TEX!). S. F. Blake (1930) saw the type in the Prodromus Herbarium and notes that it "has shown its identity with *Sigesbeckia flosculosa*" L'Her. Stirp. Nov. 37. t. 19. 1785-86.

Melampodium durandi (A. Gray) M. E. Jones, Contrib. West. Bot. 15:156. 1929. *Hemizonia durandi* A. Gray, Proc. Amer. Acad. Arts & Sci. 6:549. 1865. TYPE: CALIFORNIA: Nevada Co., ". . . in the vicinity of Nevada [City]" [Durand, 1855], ca. 3000 ft., 1851, H. Pratten s.n. (Holotype, PH?). = *Madia minima* (A. Gray) Keck, Madroño 10:22. 1949.

Melampodium geminatum Brandg. Zoe 5:223. 1905. TYPE: MEXICO: Sinaloa, Cofradia [ca 30 mi E of Culiacán near Durango border], 24 Oct 1904, T. S. Brandegees s.n. (Lectotype chosen, UC!). = *Baltimora* sp.

Melampodium? *hidalgoa* DC. Prodr. 5:521. 1836. *nom. superfl.* of *Melampodium ternatum* (Llave & Lex.) DC. = *Hidalgoa ternata* Llave & Lex. Nov. Veg. Descr. 1:15. 1824.

Melampodium hirsutum (Rich.) Jackson, Index Kew. 2: 188. 1895. *Unxia hirsuta* Rich. Act. Soc. Hist. Nat. Par. 1:105. 1792. TYPE: FRENCH GUIANA: locality unknown, 1792, *J. B. Leblond* 346 (Holotype, P; isotype, G!; photograph of G isotype, OS! TEX!). = *Unxia camphorata* L.f. Suppl. 368. 1781.

Melampodium humile Sw. Prodr. Veg. Ind. Occ. 114. 1788. TYPE: JAMAICA: "Domingo," 1783-1787, *O. Swartz* s.n. (Holotype, S; photograph of B isotype, TEX!). = *Acanthospermum humile* (Sw.) DC. Prodr. 5:222. 1836.

Melampodium L. sect. *Lecocarpus* (Dcne.) Baillon, Hist. Plant. 8:231. 1882. = *Lecocarpus* Dcne. Bot. Voy. Venus, t. 14. 1846.

Melampodium minimum (A. Gray) M. E. Jones, Contrib. West. Bot. 15:156. 1929. *Hemizonia minima* A. Gray, Proc. Amer. Acad. Arts & Sci. 6:549. 1865. TYPE: IDAHO: "Dry soil, near Soda Springs," 8600 ft., 1860-1862, *W. H. Brewer* s.n. (Holotype, GH?). = *Madia minima* (A. Gray) Keck, Madroño 10:22. 1949.

Melampodium minutiflorum M. E. Jones, Contrib. West. Bot. 18:72. 1933. TYPE: MEXICO: Guadalajara, La Barranca, 17 Nov 1930, *M. E. Jones* 27738 (Lectotype, POM; isotype, MO! US!; photograph and fragment of lectotype, US!). = *Galeana pratensis* (H.B.K.) Rydberg, Fl. N. Amer. 34(1):42. 1914.

Melampodium paludicola Taub. Engl. Bot. Jahrb. 21:455. 1896. TYPE: BRAZIL: Goias, "in paludibus ad flumen Parana-hyba [Paranaiba]," Feb 1893, *E. Ule* 2978 [=397] (Holotype, P!; isotype, F!; fragment of holotype, US!; photograph of holotype, F! OS! TEX! US!). Definitely not a *Melampodium*; "the description of which suggests a *Sclerocarpus*" (Robinson, 1901).

Melampodium? *runderale* Sw. Fl. Ind. Occ. 3:1372. 1806. TYPE: JAMAICA: "in ruderatis Jamaicae australioris," date

unknown, *O. Swartz* s.n. (Holotype, s?). = *Eleutheranthera ruderalis* (Sw.) Sch. Bip. Bot. Zeit. 24:239. 1866.

Melampodium suffruticosum Baker in Martius, Fl. Bras. 6(3):162. 1884. TYPE: VENEZUELA: "prope Esmeralda in ditione fluminis Orinoco," Dec 1853, *R. Spruce* 3225 (Holotype, K!; isotypes, G! NY! P!; photograph of holotype, os! TEX! US!). = *Unxia suffruticosa* (Baker) Stuessy, Brittonia 21:319. 1970.

Melampodium? ternatum (Llave & Lex.) DC. Prodr. 5:521. 1836. = *Hidalgoa ternata* Llave & Lex. Nov. Veg. Descr. 1:15. 1824. TYPE: MEXICO: Veracruz, "... in margine densissimarum silvarum, prope ultimam cataractam fluminis Blanco, non longe à S. Jose del Corral [near Orizaba]," Apr [year?], *P. La Llave* s.n. (Holotype, MA?).

Melampodium L. subg. *Unxia* (L.f.) Baker in Martius, Fl. Bras. 6(3):162. 1884. = *Unxia* L.f. Suppl. 56. 1781.

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LIST OF TAXA OF MELAMPODIUM

1. *M. americanum* L.
2. *M. diffusum* Cass.
3. *M. pilosum* Stuessy
4. *M. longipes* (A. Gray) Robins.
5. *M. linearilobum* DC.
6. *M. leucanthum* Torr. & A. Gray
7. *M. cinereum* DC.
 - 7a. *M. cinereum* DC. var. *cinereum*
 - 7b. *M. cinereum* DC. var. *hirtellum* Stuessy
 - 7c. *M. cinereum* DC. var. *ramosissimum* (DC.)
A. Gray
8. *M. argophyllum* (A. Gray ex Robins.) Blake
9. *M. sericeum* Lag.
10. *M. pringlei* Robins.
11. *M. strigosum* Stuessy
12. *M. longicorne* A. Gray
13. *M. nayaritense* Stuessy
14. *M. cupulatum* A. Gray
15. *M. appendiculatum* Robins.
16. *M. sinuatum* Brandg.
17. *M. rosei* Robins.
18. *M. tenellum* Hook. & Arn.
19. *M. glabribracteatum* Stuessy
20. *M. longipilum* Robins.
21. *M. longifolium* Cerv. ex Cav.
22. *M. mimulifolium* Robins.
23. *M. gracile* Less.
24. *M. microcephalum* Less.
25. *M. paniculatum* Gardn.
26. *M. divaricatum* (Rich. in Pers.) DC.
27. *M. costaricense* Stuessy
28. *M. dicoelocarpum* Robins.

29. *M. tepicense* Robins.
 30. *M. sinaloense* Stuessy
 31. *M. bibracteatum* S. Wats.
 32. *M. repens* Sessé & Moc.
 33. *M. montanum* Benth.
 33a. *M. montanum* Benth. var. *montanum*
 33b. *M. montanum* Benth. var. *viridulum* Stuessy
 34. *M. aureum* Brandg.
 35. *M. perfoliatum* (Cav.) H.B.K.
 36. *M. glabrum* S. Wats.
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